Refrigeration Service Engineer

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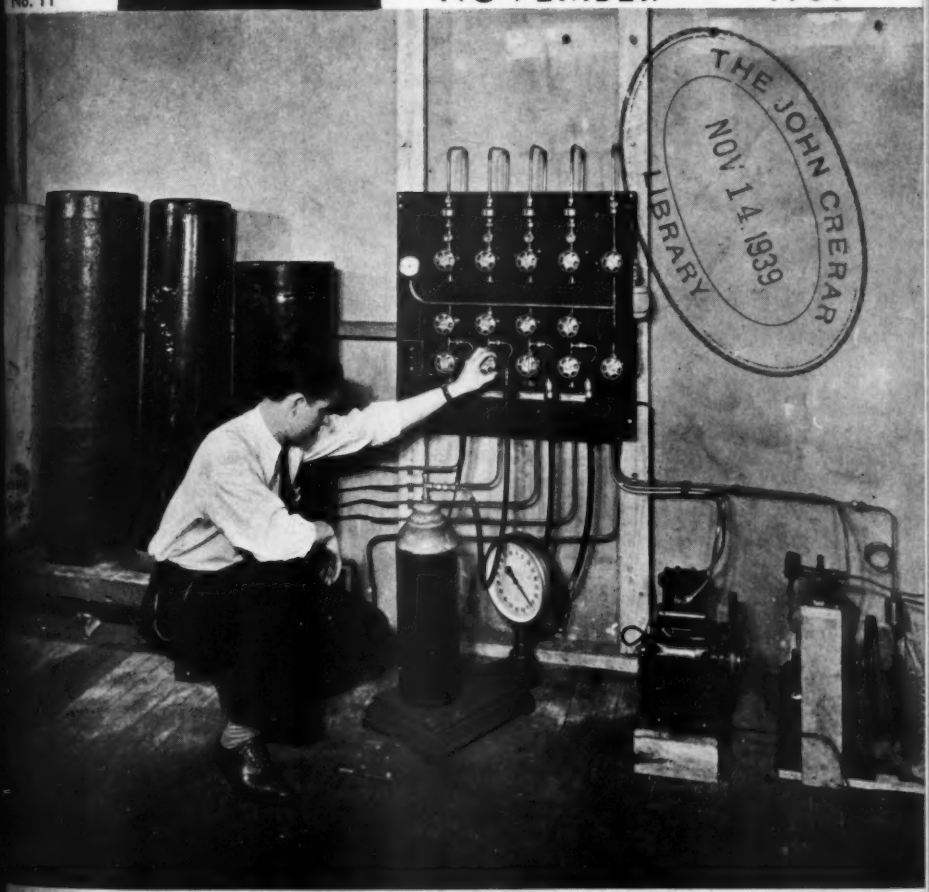

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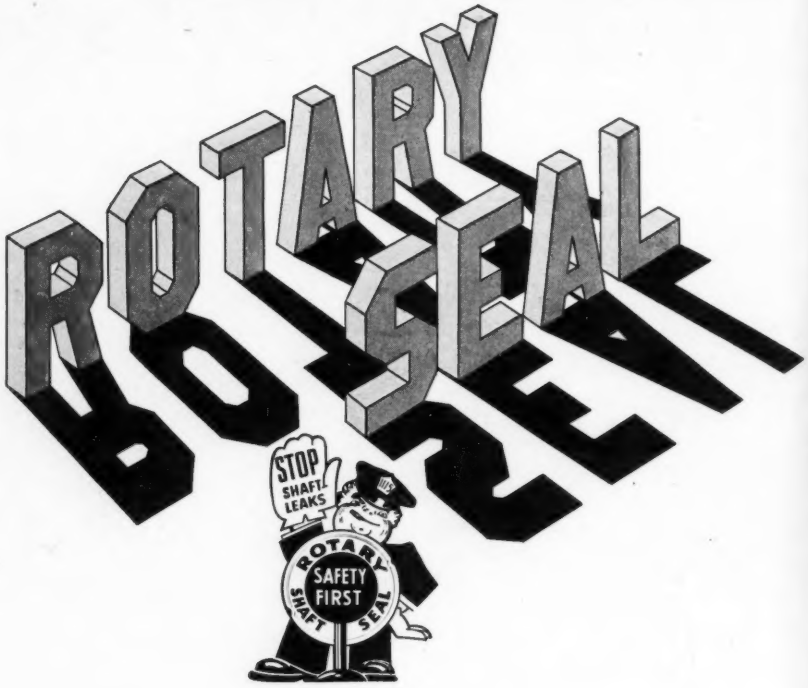

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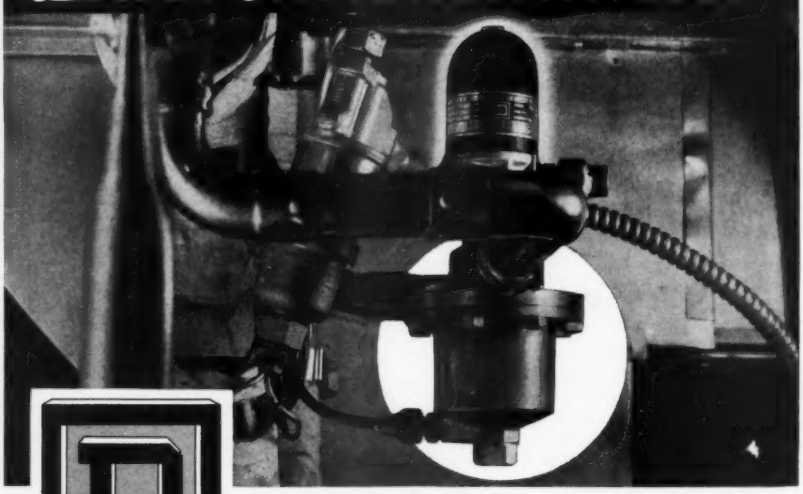

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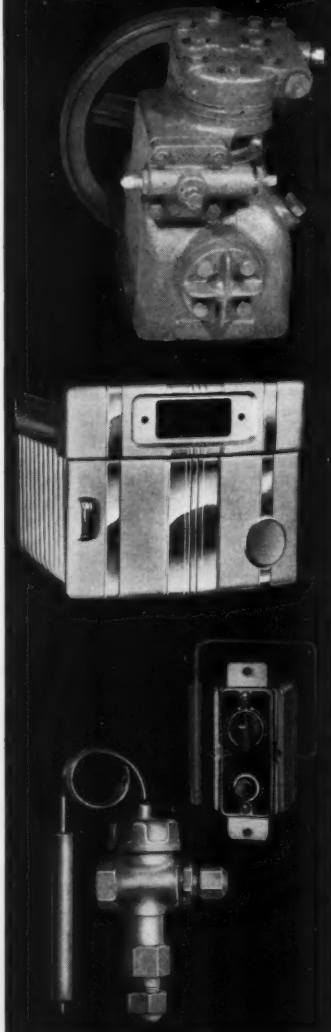

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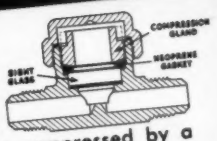

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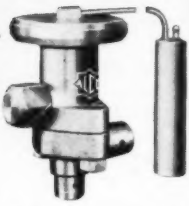

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The Refrigeration Service Engineer

Vol. 7 No. 11

November 1939

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

Official Organ
REFRIGERATION SERVICE ENGINEERS SOCIETY

Cover

This month's cover shows Mr. Henry Ambruster of Melchior, Armstrong Dessau Co. operating the new rapid charger manufactured by Superior Valve & Fittings Co. An article on the construction and operation of this charger appears on page 27.

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TABLE OF CONTENTS

Construction and Operation of the Westinghouse Unit 11
Chemical and Mechanical Aspect of Locker Storage Plants (Second Article), *by Martin G. Lane* 15
Flash Gas, *by A. F. Hoesel* 19
Simplified Air Conditioning (Seventh Article), *by George G. Borden* 21
A Word About Tools, *by H. D. Busby* 24
Refrigeration Equipment Manufacturers Association Holds Fall Meeting 26
Rapid Drum Chargers 27
Service Kinks 28
- Bottle Cooler Agitator 28
- Cleaning Coils 28
- Seal Holding Tool 29
- Shaft Turning Tool 29
- Freeing Stuck Compressors 29
- Flash Light Accessory 30
- Wheel and Gear Puller 30

Question Box 31
- Building an Oven 31
- Moving Crosley to Basement 31
- Multiple Installation 31
- Oily Mass Clogging Valve 34
- Unbalanced System 34
- Refrigerating an Ice House 35
- Assembling Joints 35
- Coldspot Troubles 36

R.S.E.S. News 38
- On to Chicago 38
- New Chapters Being Formed 39
- Illinois State Association Holds Second Annual Meeting 40
- Tri-County Chapter Picnic 42
- Central Indiana Chapter Plans 44
- Additional Convention Committees Appointed 44
- S. A. Leitner Reports on Chapter Activities 44
- Chapter Notes 45
- Tri-State Auxiliary 52
- Kansas City Auxiliary 53

News of the Industry 54

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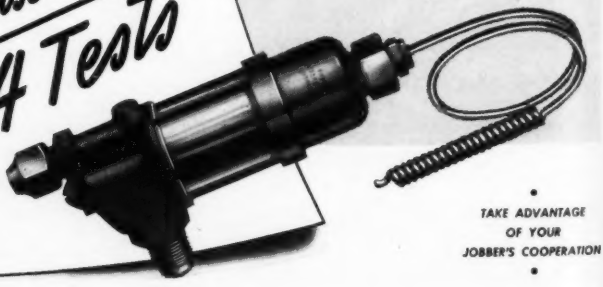
2-needle & seat
1-connections
4-complete assembly
14 Tests



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The Refrigeration Service Engineer

Vol. 7, No. 11 CHICAGO, NOVEMBER, 1939 $2.00 per Annum

Construction and Operation of The Westinghouse Unit

THE first Westinghouse units to be placed on the market in any quantity were manufactured in 1930. During that year and on some models during 1931, a porcelain on steel, brine tank type of evaporator was employed with an expansion valve as the refrigerant control.

Some models in 1931 and all models in succeeding years employed a high side float with a direct expansion evaporator. Up to and including 1933 these evaporators were of the pressed steel porcelain enameled type, but in succeeding years they were pressed from a metal called Sanalloy and seam welded.

With these few exceptions the general design and contour of the unit has remained the same to the present day. It is of the package type as may be seen in Fig. 1 and is one of the few truly hermetic units in which the casing is sealed by electro-welding.

The compressor operates in the vertical position as shown in Fig. 2 and is of the reciprocating type. The smaller cabinets are equipped with a single cylinder compressor while the larger cabinets are equipped with a V-type twin cylinder compressor. Construction of the two compressors is very similar and many parts are interchangeable.

The same hardened steel shaft serves both the motor and the compressor, providing a

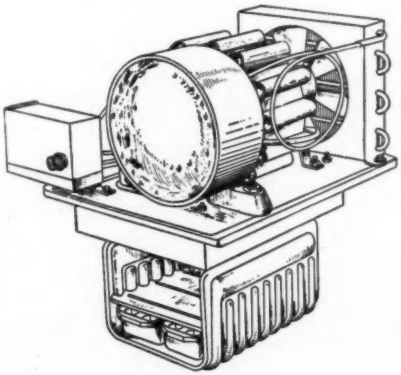


FIG. 1

rigid direct drive between the two. Grooves cut in the piston provide adequate lubrication to all parts of the piston and cylinder. The cylinder head and valve plate are ground

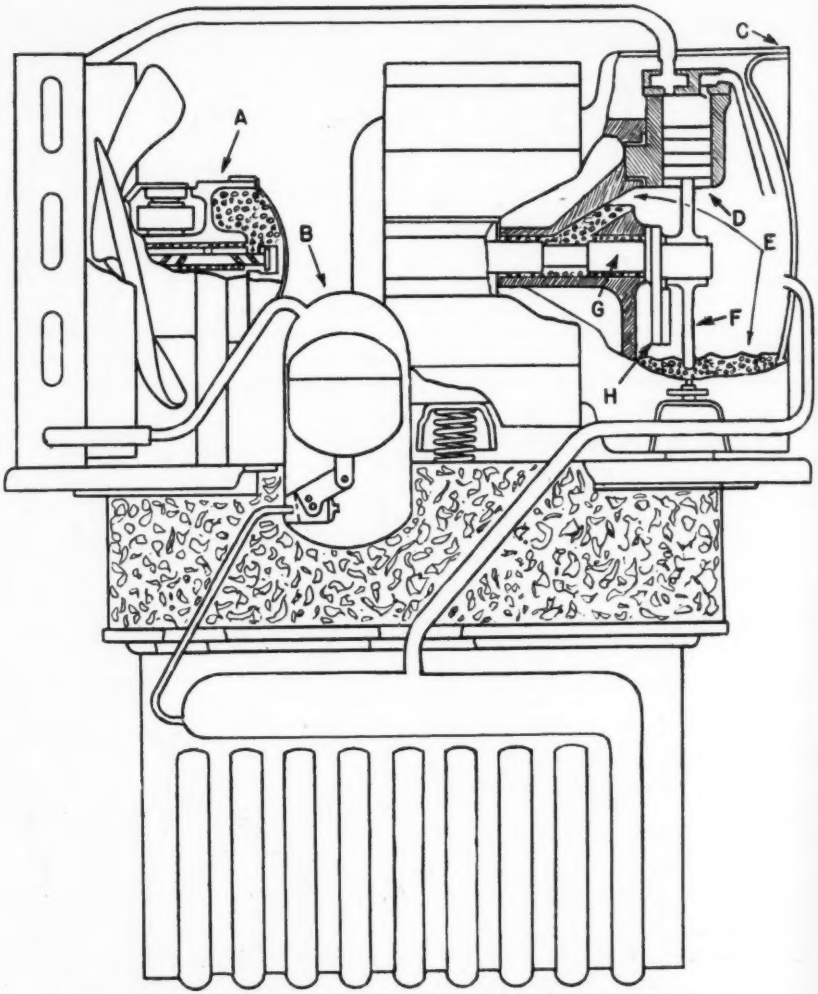


Fig. 2.—A cut away view of the working parts of the Westinghouse unit

to a gas tight surface which eliminates the need of a gasket at this point. Flapper suction and the discharge valves are made of Swedish steel.

An unusual constructional feature of this unit which is seldom found outside of large tonnage machines is the adjustment provided for obtaining the correct clearance between cylinder head and piston. In this unit a stud protruding from the side of the cylinder block fits into an eccentric bushing mounted in the compressor frame. When the cylinder is fitted into place on the frame the bushing is turned so as to lower or raise the cylinder a few thousandths of an inch until the proper clearance is obtained. This adjustment insures the maximum efficiency from the compressor.

Pulsation noises within the compressor are reduced to a minimum by the use of suction and discharge mufflers. In Fig. 3 three mufflers are shown, two of which are for the

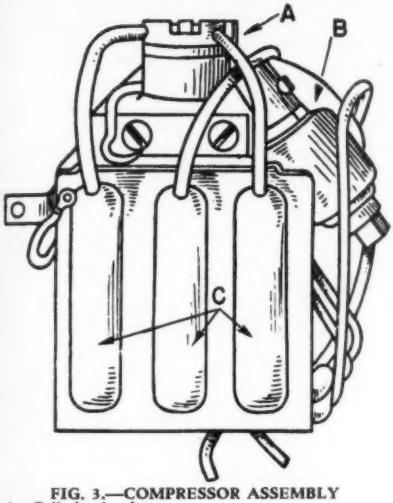


FIG. 3.—COMPRESSOR ASSEMBLY
A—Cylinder head
B—Magnetic unloader
C—Suction and discharge mufflers

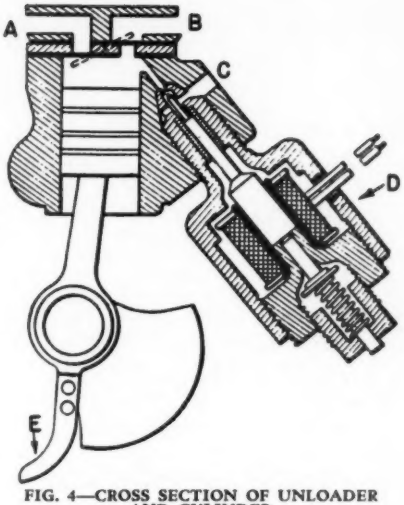


FIG. 4—CROSS SECTION OF UNLOADER AND CYLINDER
A—Suction inlet
B—Discharge part
C—Unloader outlet
D—Magnetic unloader
E—Oil scoop

suction side and one for the discharge side. The three mufflers are formed in one piece from pressed steel and offer very little resistance to the flow of gas.

Easy starting of the motor is assured under normal conditions by the use of a magnetic unloader pictured in Fig. 4. The unloader is similar to a solenoid valve. It employs a needle valve which is held in the closed position normally by a spring. The coil of the valve is connected in the common return circuit from both the starting and running winding of the motor. The current drawn through it by the running winding only is not sufficient to energize the valve but the increased surge caused by both running and starting windings being thrown on the circuit creates sufficient current to energize the coil and open the valve. High pressure gas is then by-passed from the top of the piston back to the suction side of the compressor, equalizing the pressure. As soon as the motor is up to speed and the starting winding is cut out of the circuit the unloader valve is de-energized and closes.

The motor on the single cylinder units is a split-phase induction ⅛-hp. motor with a speed of 1750 r.p.m. The twin cylinder unit employs a ¼-hp. capacitor type motor. Since high or low voltage, overloads, or other unusual conditions will result in overheating of the motor and possible damage to it this unit is protected by a device which is actuated by the heat of the motor rather than by the usual device which is sensitive to the amount of current drawn through it.

As is illustrated in Fig. 5, a device which is known as the "Spencer Disc" is mounted on the outside of the motor casing and in direct contact with it. This device is a bi-

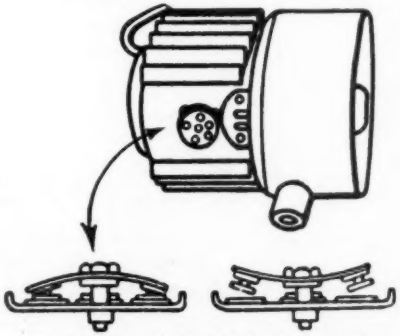


Fig. 5—The overload switch in the open and closed position

metallic disc which changes its shape when heated. It is normally concave in shape but snaps into a convex shape when a predetermined temperature is reached. Contacts

mounted on the outer edge of the disc provide a means of breaking the electrical circuit when the disc snaps into the convex position. The disc snaps back to its original position when cooled, thus forming an automatic resetting overload cutout. The disc opens the circuit at about 170 degrees F. and closes it again at about 130 degrees F.

Proper lubrication to all parts of the compressor is provided through a splash system. The oil scoop F in Fig. 2 picks up the oil from the main supply in the base of the compressor and throws it upward where part of it is caught in the oil well at E. From this point it flows into the motor and compressor main bearings. The piston and connecting rod receive their lubrication from the splash of the scoop.

The complete motor and compressor after assembly is forced into the pressed steel casing and a cap is welded in place over the opening, sealing the unit closed. To open the unit for service it is necessary to cut away the weld at the point marked C in Fig. 2.

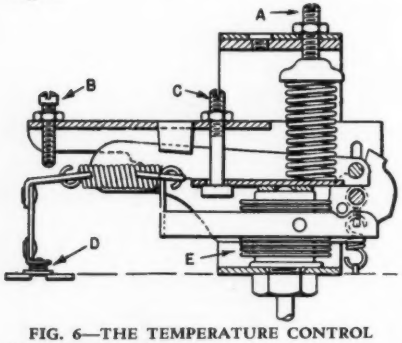


FIG. 6—THE TEMPERATURE CONTROL
A—Temperature adjustment
B—Contact adjustment
C—Rocker arm stop screw
D—Main contacts
E—Power element

The condenser is constructed of copper tubes with steel fins. A separate motor with a rating of 1/200-hp. drives the cooling fan. This motor is entirely enclosed with a large supply of oil for lubrication. No outside oiling is required.

The high side float valve utilizes sliding ports to control the flow of the refrigerant rather than the usual needle valve. This type of valve cannot be made to hold gas tight, but they do restrict and regulate the flow of liquid refrigerant so that proper operation is obtained.

The working parts of the temperature control are shown in Fig. 6 and the wiring diagram for the entire unit is shown in Fig. 7. The thermostat is actuated by a copper bellows with a feeler bulb attached to the evaporator. As the evaporator warms up the control bellows expands until the main contacts close. Current is then supplied to the running winding of the motor. The high amperage drawn by the running winding in its effort to start the motor induces sufficient magnetic force in the relay coil to cause the relay arm to be drawn up, closing the circuit to the starting winding. The fan motor is in parallel with the main motor and

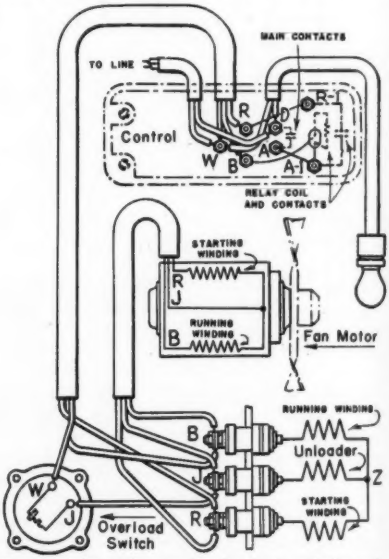


Fig. 7.—Wiring diagram for the single cylinder unit. Wiring colors are—D-B—black. R—red. J-W—White

because the relay is designed to depend on the current drawn by both these motors it will not operate if the fan is disconnected from the circuit.

When the motors have reached their rated speed and the current through the relay is reduced, the relay arm drops, breaking the starting circuit and the motor continues to operate on the running winding.

Most of the units are charged with sulphur dioxide but some models manufactured since 1934 are charged with Freon (F12). Charging is done as in all high side float systems by adding refrigerant until the frost line remains about two inches from the evaporator on the suction line.

Second Article

The Chemical and Mechanical Aspect of Locker Storage Plants

In the October issue the author of this series discussed the preparation of foods and the effect on them of freezing.

By MARTIN G. LANE*

Compressor Capacity

CAPACITY of refrigerating plants is measured in tons. This is the measured rate at which heat is removed as it is absorbed in the evaporator and is equivalent to the amount of heat that is absorbed by one ton of ice melting in 24 hours. The latent fusion of ice is 144 B.t.u. per pound. The heat absorbed when one ton melts is 2000x144 or 288,000 B.t.u. This quantity expressed in B.t.u. per hour is 12,000, or 200 B.t.u. per minute. A compressor is said to have a capacity of one ton when it has sufficient displacement to remove from the evaporator the volume of refrigerant vapor that is produced by the absorption of 200 B.t.u. per minute. This volume is a function of the weight of refrigerant that must be evaporated to absorb the 200 B.t.u. and of specific volume, which in turn is a function of the pressure.

Let us suppose that the refrigeration requirements of a certain room is one ton and that the temperature in the evaporator 5 degrees F. Let us assume that the liquid comes to the expansion valve at 86 degrees F. and that the refrigerant is ammonia. The heat in the liquid is 138.9 B.t.u. per pound. After the ammonia has evaporated its heat content will have increased 613.3 B.t.u. per pound. The net heat absorbed in the evaporator is 613.3 minus 138.9 or 474.4 B.t.u. per pound. This is called the refrigerating effect per pound. Since one ton is the removal of 200 B.t.u. per minute the number of pounds of ammonia that will have to be evaporated to produce one ton of refrigeration and be pumped out by the compressor is 200/474.4 or about 0.417 pound per minute. The volume of ammonia vapor coming from the evaporator at this temperature of 5 degrees F. will be 8.150 cubic feet per pound, and the effective displacement of the machine must be 0.417 x 8.150 or 3.38 cubic feet per minute. Now let us suppose that the evaporator temperature is increased to 10 degrees F. The weight of refrigerant that must be circulated to produce refrigeration at the rate of one ton is very nearly the same, but the volume per pound is 7.3 cubic feet and the capacity is 8.150 ÷ 7.3 which is 1.12 times as great. It can be seen from this that when specifying the capacity of the compressor, the evaporating temperature or the suction pressure and the discharge pressure must be specified if the rating is to have any meaning at all.

The magnitude of the effect of the suction and discharge pressures on effective displacement can be readily seen from Figure 1. Discharge pressure in pounds per square inch gage is plotted as abscissa and effective displacement in cubic feet per ton minute as ordinate. The exact relationship is so nearly direct that it is shown by nearly straight lines.

The effective discharge pressure on effective displacement is not great. Its effect on actual displacement, however, is considerable because the volumetric efficiency decreases as discharge pressure increases. The effect of suction pressure is very marked. The required compressor displacement with a 5 degree F. suction pressure is practically twice the amount when the suction pressure is 15 pounds gage.

Power Requirements

In the example just stated the evaporating pressure or suction pressure is 34.27 pounds absolute and for the second case 38.7 pounds absolute. The condensing pressure corresponding to 86 degrees F. is 169.2

* Eureka Engineering Service, Sioux City, Iowa.

pounds absolute. Obviously it takes more horsepower to drive a compressor that is compressing a gas from 34.27 to 169.2 than it does from 38.7 to 169.2 pounds. It is well known that the power requirements for low evaporating temperatures is greater than for high temperatures. The power requirements for a medium sized machine with reasonable allowance for efficiency is shown in Figure 2. Discharge pressure in pounds per square inch is plotted as abscissa and the horsepower per ton as ordinate. For each suction pressure a different line shows the relationship. It will be observed that for any given suction pressure the horsepower input to the compressor increases as the discharge pressure increases. This increase is so nearly a straight line relationship that it

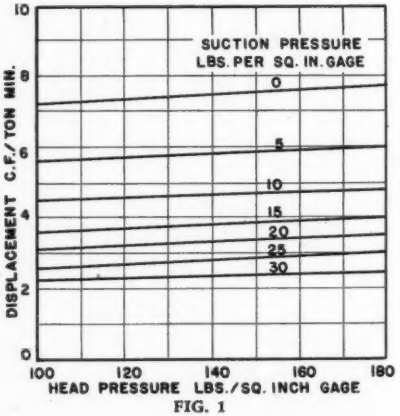


FIG. 1

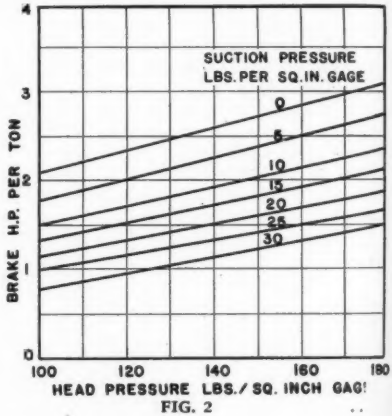


FIG. 2

is so indicated. Also for low suction pressure the energy requirements are greater than for high suction pressures. Energy consumption for the driving motor is lowest, for any given plant capacity, when the suction pressure is highest and consistent with maintenance of proper temperatures and when the discharge pressure is low as can be economically maintained. It can be seen thus far that the condensing unit should be given careful consideration.

Locker Storage

The floor plan is largely dictated by local requirements and conditions. There are, however, certain factors that should be taken into consideration. Let us refer to the floor plan in Figure 3. The customer coming in passes through the office where it is easy to keep a check on everyone who enters. He passes through the cutting room, then through a corner of the chill room and into the locker storage proper. If anyone is about the plant it will be hardly possible for anyone to enter who has no reason to do so. As a precaution against theft this is important.

Goods that are brought in pass directly to the cutting room or can be taken to the chill room. When ready they need be moved only a short distance from the chill room to the freezer. From the freezer they can be quickly shifted to the locker storage proper. The cutting room serves as an anteroom to the chill room and reduces the heat leakage and number of air changes in that room. The chill room serves the same purpose in relation to the locker room and the locker room with respect to the freezer. The result is that not as much frost collects on the coils as would be the case if all the rooms opened directly to the outside. This plan is merely an ideal arrangement and is merely offered to illustrate some of the engineering aspects of the problem. Managers of different plants might have a different idea of a suitable arrangement and adapted to their individual situations. The size of the plant, the variety of the services rendered and other business all should be considered in the final layout. The more nearly square the layout is the smaller will be the investment in insulating material.

The heat that must be removed from a room is made up of several items. Heat leakage through walls, floor, and roof constitute an appreciable amount; other items

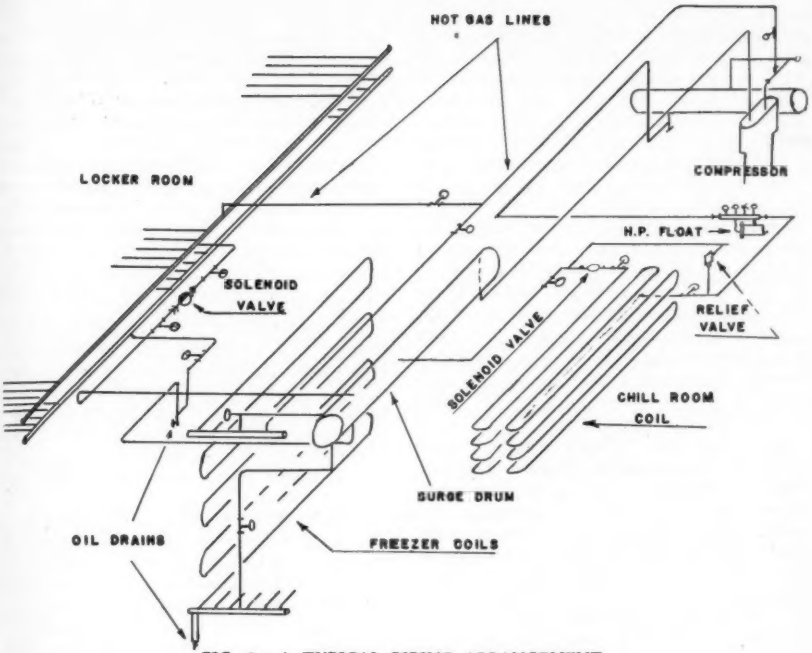


FIG. 3.—A TYPICAL PIPING ARRANGEMENT

are heat due to lights, and to people who may be in the rooms, heat due to entrance of warm air when doors are opened, and heat to be removed from goods. In a locker storage it is almost impossible to estimate all these quantities even approximately. But the heat leakage can be estimated with fair accuracy. This is done by the following method. The outside air for summer can be taken as 80 degrees F. as a 24-hour average in most parts of Iowa, and in cold storage work it is the 24-hour average that is important rather than the daily maximum. The ground temperature can be taken at about 60 degrees F. For a locker room maintained at 5 degrees F. the temperature gradient through the floor is 60 minus 5 or 55 degrees, while through the outside walls it is 80 minus 5 or 75 degrees. For any given construction the heat transfer coefficient can be computed as shown in the section under insulation. A coefficient of 0.05 B.t.u. per square foot per hour per degree F. is reasonable. Let us take the illustration and tabulate the various leakages. The south wall of the locker room is 36 feet long, if the ceiling is 10 feet high the area is 360 square feet. The heat leakage is $H = UA\ (T_1 - T_2)$, where U is the heat transfer coefficient in B.t.u. per square foot per hour per degree gradient. A is the area of the wall in square feet, and $(T_1 - T_2)$ is the temperature gradient through the walls. The heat leakage through this wall is $0.05 \times 360 \times 75$, or 1350 B.t.u. The west wall has the same dimensions and the leakage will be the same; that is, 1350 B.t.u. The north wall is 26 feet long and the area is 260 square feet. The heat leakage is $0.05 \times 260 \times 75$ or 975 B.t.u. per hour. The wall next to the freezer is 21 feet long and the area is 210 square feet. The recommended freezer temperature is minus 15 degrees F. The temperature is from 5 degrees F. to minus 15 degrees F. or 20 degrees and the heat leakage is equal to $0.05 \times 210 \times 20$ or 210 B.t.u. per hour. The distance along the wall next to the chill room which is held at 32 degrees F. is 10 feet and the area is 100 square feet. The temperature gradient is 32 minus 5 or 27 degrees. Heat leakage is $0.05 \times 100 \times 27$ equals 135 B.t.u. per hour. The side next to the cutting room is 15 feet long and the area is 150 square feet. The cutting room tem-

perature can be taken at 60 degrees F. which gives a temperature gradient of 60 minus 5 or 55 degrees. Heat leakage is 0.05 × 150 × 55 or 412 B.t.u. per hour. The gross area of the ceiling is 36 × 36 or 1,296 square feet, deducting for the area above the freezer 9 × 10 or 90 square feet gives 1,296 — 90 or 1,206 square feet. Heat leakage is 0.05 × 1,209 × 75 or 4500 B.t.u. The ground temperature can be taken at 60 degrees, so the gradient will be 60 — 5 or 55 degrees; the area will be 1,209. The heat leakage will be 0.05 × 1,209 × 55 or 2500 B.t.u. These figures can all be summarized to give the grand total of the leakage losses, and a similar procedure used in the case of other rooms.

Piping

Experience has proven that if locker rooms are piped on the basis of 3.5 cubic feet of space per foot of 1¼-inch pipe satisfactory operation is given. There are several other methods such as plates arranged for single induction or double induction. The liberal use of pipe makes possible a small temperature difference between the piping and air in the room, which, in turn, makes possible fairly high humidity. When the air in the room comes in contact with the cold pipe surrounding surface is cooled to the dew point temperature. This air mixes with the remaining air, and the average dew point approaches that corresponding to the temperature of the pipe surface. Small differences between room temperatures and pipe surface temperatures allow for maintenance of a higher dew point and higher humidity, which results in less dehydration of the goods in storage. It also allows use of a higher suction pressure than could be used if less pipe were used, a condition that results in more economy of operation. The gross volume of the room under consideration is 36 × 36 × 10 or 12,960 cubic feet. The volume occupied by the freezer is 9 × 10 × 10 or 900 cubic feet. This leaves a net volume for the locker storage of 12,060 cubic feet. The number of feet of pipe required in this case is 12,060 ÷ 3.5 or 3,450 lineal feet. It requires 2.3 lineal feet of 1¼-inch pipe to furnish one square foot of surface. The number of square feet of surface is 3,450 ÷ 2.3 or 1,500 square feet. On the basis of 10 degrees difference between evaporating temperature and room temperature the heat absorbing capacity is approximately 2 B.t.u. per square foot per hour per degree and the total heat absorbing capacity is $H = UA (T_1 - T_2)$ equals 2 × 1500 × 10 or 30,000 B.t.u. per hour. Since this is approximately 3 times the amount of heat leakage, there is a margin of 20,000 B.t.u. per hour to provide for refrigeration of goods and other items. Under storage conditions when no new goods are being brought in other losses are small, and it will be necessary for the compressor to operate only about one-third of the time.

Chill Room

The chill room should be large enough to hang meat for a long enough period to age it properly. There is no standard size agreed upon by operators. For purpose of illustration a room about 8 x 20 x 10 feet high is suggested. Experience has shown that about 7 cubic feet of space per lineal foot of 1¼-foot of pipe is reasonable. The total number of feet of pipe is 1,600 ÷ 7 or 229, which has an area of 100 square feet. The coils should be placed about 8 to 12 inches below the ceiling, with a sloping insulated baffle underneath to catch any moisture that drips from the coils. These coils will usually be connected to the suction of the same compressor that serves the locker room. The evaporator temperature is minus 5 and since the room is being held at a temperature of 32 degrees the temperature difference is 37 degrees. The heat that the coils will absorb is $H = UA (T_1 - T_2)$ equals 2 × 100 × 37 or 7,400 B.t.u. per hour. By using the same method as was used in computing the heat leakage in the locker room the heat leakage in the chill room may be estimated. In order to hold the room the coils need to be in operation 790 ÷ 7,400 or 0.106 or 10.6 percent of the time. If meat is brought in at 90 degrees F. and is cooled to 32 degrees F., the amount of heat that must be removed to cool a pound can be taken at (90 — 32) × 0.7 or 40.6 B.t.u. The specific heat can be taken at 0.7. The margin of 7,400 — 790 or 6,610 B.t.u. is enough refrigeration to cool 6,610 ÷ 40.6 or 162 pounds per hour.

Compressor Capacity

The compressor to serve the locker room and chill room should have enough capacity to compress the vapor that results from the use of all the coil surface in both rooms. The capacity of the coils in the locker room is 30,000 B.t.u. per hour and that of the chill

room is 7,400 B.t.u. per hour, making a total of 37,400 B.t.u. per hour. This is 37,400 ÷ 12,000 or 3.12 tons, as a ton is 12,000 B.t.u. per hour. With cooling water entering the condenser at 70 degrees F. and leaving at 80 degrees F. the discharge pressure will be about 145 pounds gage. For an evaporating temperature of minus 5 degrees F. the suction pressure is 12.2 pounds gage. From Figure 1 the effective displacement necessary can be found and is about 4.4 cubic feet per ton minute. The total effective displacement is 3.12 × 4.4 or 13.7 cubic feet per minute.

A pound of ammonia vapor at minus 5 degrees F. has a heat content of 610 B.t.u. and a pound of liquid ammonia at 145-pound gage has a heat content of 135 B.t.u. The difference is 475 B.t.u. which is the net refrigerating effect of each pound of ammonia. The amount of ammonia that will have to be circulated per hour is 37,400 ÷ 475 or 78.8 pounds. This is 88.8 ÷ 60 or 1.31 pounds per minute. At minus 5 degrees F. the volume of one pound of ammonia is 10.23 cubic feet. The effective displacement of the compressor is then 1.31 × 10.23 or 13.4 cubic feet per minute as against 13.7 cubic feet obtained by use of Figure 1. A reasonable volumetric efficiency may be taken as about 77 percent which would make the total displacement 13.4 ÷ 0.77 or 17.4 cubic feet per minute. For this service a two-cylinder motor driven compressor would be used. A 4 x 4 inch, 2-cylinder, single acting compressor running 300 r.p.m. will be about the proper size. The power requirement can be read from the diagram in Figure 2. For the condition given it is about 1.93 brake horsepower per ton and the total horsepower will be 1.93 × 3.12 or 6.02. The next larger standard size electric motor would be used; in this case 7½ h.p.

(To be Continued)

Flash Gas

By A. F. HOESEL*

A MECHANICAL refrigerating system generally comprises a cooling unit from which a volatile refrigerant vapor, under comparatively low temperature and low pressure, is evacuated by means of a compressor which compresses the vapor, under comparatively high temperature and high pressure, into a condenser in which the vapor rejects its heat and thereby condenses to a liquid having a temperature in accordance with its pressure.

This condensed high pressure refrigerant liquid is then led to some sort of pressure reducing means—such as an automatic expansion or a thermostatically controlled expansion valve, or a capillary tube flow restrictor or possibly a hand-operated expansion valve—in which the pressure of the fluid, due to its passage through such pressure reducing means, is reduced to the low pressure within the cooling unit.

Now, if we had a thermometer, in the refrigerant fluid and at both sides of the pressure reducing means, we would find that the fluid was reduced in temperature, as well as pressure, after passing through the pressure reducing means.

This condition is readily recognized, especially on jobs in which the cooling unit is operated below freezing temperatures, because the inlet side of the expansion valve has no frost while the outlet side of the expansion valve will be frosted.

To illustrate, graphically, just what occurs to the refrigerant liquid, in its passage through the pressure reducing means, we now refer to Fig. 1.

At the left-hand side, we show a pound of Freon liquid, at 90 degrees F. temperature and 100 lbs. gauge pressure, which has a volume of 21.6 cubic inches.

We shall assume this pound of Freon liquid as passing from the liquid line through the expansion valve, as indicated. Immediately as its pressure is reduced to the 21 lbs. indicated, we note that 23.8 percent, or .238 lbs., of liquid is vaporized in order to cool down the one pound of liquid, passed through the expansion valve, to 20 degrees F., which is the corresponding temperature, of Freon liquid, for a gauge pressure of 21 lbs.

*Chief Engineer, Peerless of America Inc., Chicago, Ill.

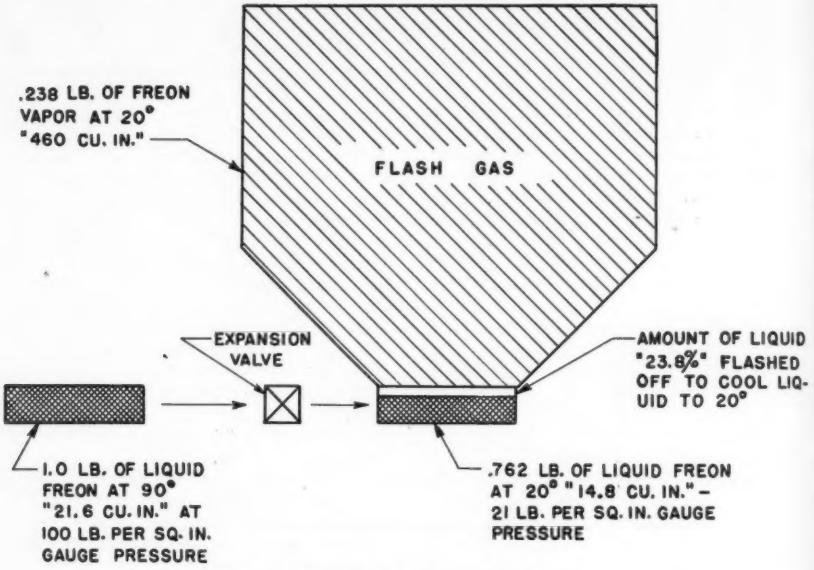


FIG. 1.—Volume of flash gas per lb. of liquid

This .238 lbs. of Freon liquid, which is so vaporized, is termed "flash gas" since it flashes off from the liquid Freon simultaneous with its reduction of pressure.

Figure 1 graphically illustrates the proportionate volumes between the liquid and the vapor for the given conditions of temperatures and pressures. 23.8 percent of the liquid Freon, or a volume of 5.15 cubic inches, was vaporized and now occupies, in its vapor phase, a volume of 460 cubic inches.

Of course, an expansion valve does not dump a pound of refrigerant into the cooling unit at one time; but, as the expansion valve feeds the refrigerant to the cooling unit, all of the above proportionate conditions occur for any rate of flow through the valve at the indicated temperature conditions.

While different volatile refrigerant liquids have different volumetric proportions, of flash gas to liquid, for given conditions of temperature differences between the inlet and outlet of the pressure reducing means, it might be here mentioned that, in general, it is advantageous to reduce, as much as possible, the flash gas so generated, because it imposes an additional resistance, due to its volumetric displacement, to the flow of refrigerant fluid through the cooling unit. This is especially true of long series circuit cooling units, in which such flash gas generates an additional flow resistance because it has to traverse the entire circuit.

There is only one way to decrease the amount of flash gas, and that is to decrease the temperature difference of the refrigerant at the inlet and outlet of the pressure reducing means. Obviously, it is impossible

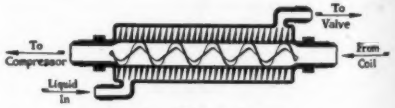


Fig. 2.—Heat exchanger

to raise the temperature of the cooling unit; therefore, the only remaining solution is to decrease the temperature of the refrigerant liquid prior to its passage through the pressure reducing means.

By means of a heat exchanger interposed in the suction line, leading from the cooling unit to the compressor, such as shown in Fig. 2, the liquid refrigerant surrenders part of its heat to the refrigerant fluid passing from the cooling unit, and is thereby decreased in temperature.

In Fig. 3, we graphically illustrate the

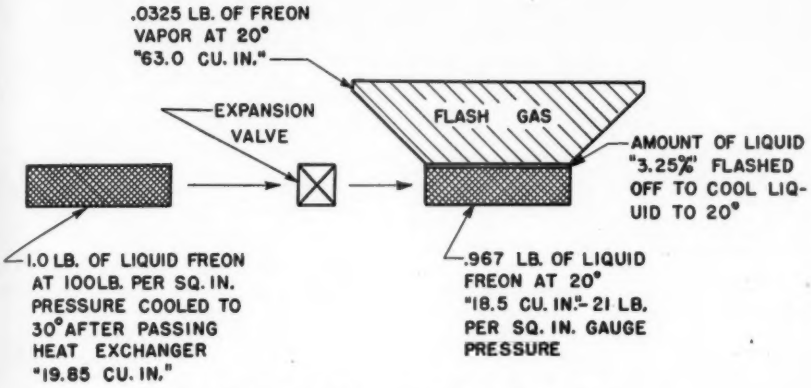


Fig. 3.—Volume of flash gas after heat exchanger is installed

conditions which would obtain if the pound of Freon liquid were passed through such heat exchanger and reduced from its original temperature of 90 degrees F. (Fig. 1) to a temperature of 30 degrees F.

We now note that, in Fig. 3, the amount of flash gas is reduced to only 63.0 cubic inches and only .645 cubic inches of Freon liquid is vaporized, because the temperature difference, of the Freon liquid, which was $90 - 20 = 70$ degrees F. in Fig. 1, is now only $30 - 20 = 10$ degrees F.

Seventh Article

Simplified Air Conditioning

By GEORGE G. BORDEN

FROM previous discussions, we know that the total heat in a pound of air is indicated by its wet bulb temperature. That is if we know only the wet bulb temperature of air we can find out how many B.t.u.'s each pound of air contains from the psychrometric chart. At any given wet bulb temperature, the dry bulb temperature will depend upon how much moisture is held in the air.

Air is usually cooled by passing it over a cold cooling coil. However, it is entirely possible to cool air without the use of mechanical refrigeration and while we are studying the psychrometric chart, we would like to outline briefly how this can be done.

If we were to take a long enclosed pan of water with a duct over the surface of the water such as shown in Fig. 1, and then pass air over the surface of this water slowly, the air would pick up water from the pan. If the pan were long enough and the air were in contact with the water for a comparatively long period of time, the air would leave the duct completely saturated with water, that is, with a relative humidity of 100 percent.

It takes heat in order to change liquid water into water vapor; therefore if the air passing through the duct picked up water and vaporized it, heat must have been obtained from some source.

The absorption of water caused the air to transform some of its sensible heat into latent heat and this latent heat is what was used to evaporate the water. This transformation of heat was done at a constant wet bulb temperature so that the total heat in the air remained exactly the same. But the transformation lowered the sensible heat and

raised the latent heat in the air. In other words the dry bulb temperature of the air must have been lowered in the humidifying process while the wet bulb temperature of the air remained the same.

Let's work out several examples to see just how air can be cooled by humidification.

Suppose the air entered the pan at 90 degrees 40 percent, and that it was completely saturated when it left the pan. What would its final temperature be and how much moisture would it pick up in passing through the pan?

Air at 90 degrees 40 percent has a wet bulb temperature of 71 degrees. If in humidifying air, its total heat remains the same, its wet bulb temperature remains the same. Hence, the final temperature of the air after passing over the water would be 71 degrees D.B. 71 degrees W.B.

Air at 90 degrees 40 percent R.H. has a dew point temperature of 62 degrees, and holds 84 grains of moisture per pound. (This is found by traveling horizontally to the extreme left of the psychrometric chart and reading the grains of moisture on Scale A.)

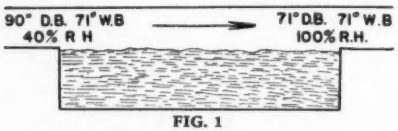


FIG. 1

Air at 71 degrees 100 percent R.H. has a dew point temperature of 71 degrees and holds 114 grains per pound. Hence, in changing one pound of 90 degrees 40 percent Air into one pound of 71 degrees 100 percent air, 114 — 84 = 30 grains of moisture were added to the air and the dry bulb temperature of the air was dropped from 90 degrees to 71 degrees, or a change of 19 degrees. However, this air in spite of its low temperature would not produce an ideal comfort condition in a room because of its very high relative humidity.

This principle of air cooling is used in machines called air washers. An air washer consists of a large fan, a spray chamber, and a set of filters so arranged that the fan pulls air first through the filter where the air is cleaned, and then through the spray chamber where several banks of water sprays thoroughly mix the air with water. In passing through these sprays, the air picks up moisture and thus is cooled. To prevent water from being carried into the fan assembly a water eliminator mat is placed between the spray and the fan. However, because it is necessary to produce comfort, it is necessary to lower the saturated air temperatures to considerably less than 71 degrees. Generally the temperature of the air leaving the washer is reduced to between 55 degrees and 60 degrees. This is accomplished by holding the spray water temperature to about 50 degrees.

When the spray water is held at 50 degrees, the air in passing through the sprays is saturated at its wet bulb temperature but because the spray is colder than the wet bulb temperature, heat flows from the saturated air into the spray water and thus the air is actually cooled. The wet bulb temperature of the air is reduced to almost that of the spray water. Because the air is cooled below its dew point temperature, moisture is also removed from the air in the air washer.

Using a Spray System

When well water can be obtained at temperatures between 50 degrees and 55 degrees, good comfort conditions can be obtained by means of the air washer type of conditioner without the use of mechanical refrigeration. In this type of system a pump is used to lift water from the well and pass it through the sprays. The drip water from the sprays is passed into a drain. However, when well water cannot be obtained at temperatures below 55 degrees, it is necessary to use mechanical refrigeration to cool the spray water before it is circulated through the sprays. In this type of washer, the spray drip is cooled by refrigeration, and then recirculated through the sprays.

As an example suppose air entered an air washer at 82 degrees D.B., 69 degrees W.B. and left the washer at 55 degrees 100 percent. How many B.t.u. of total heat, and how many grains of moisture would be removed from each pound of air passed through the washer?

Air at 69 degrees W.B. holds 32.5 B.t.u./lb.
Air at 55 degrees W.B. holds 23.0 B.t.u./lb.

B.t.u. per lb. removed = 9.5

Air at 82 degrees D.B. 69 degrees W.B. holds .....86 grs./lb.
Air at 55 degrees D.B. 100 percent holds .....64 grs./lb.

Grs. of moisture per lb. removed ..... = 22

A very interesting air cooling system that uses no mechanical refrigeration and that will produce comfort conditions with ordinary tap water at 70 degrees to 75 degrees is the Silica Gel System.

The Silica Gel system makes use of heat in order to produce cooling and it operates in a very interesting manner. This type of system permits individual control of relative humidity and dry bulb temperature.

When air passes through a bed of Silica Gel, the Silica Gel removes moisture from the air. But the removal of moisture is accomplished without affecting the wet bulb temperature of the air.

We know that in removing moisture from air that the air must give up some of its latent heat. If this latent heat is given up without affecting the wet bulb temperature of the air, the dry bulb temperature of the air must increase. That is exactly what happens. When the air passes through the Silica Gel, moisture is removed and the air temperature increases materially.

The warm air from the Silica Gel bed is then made to pass over a finned type cooling coil through which ordinary city water is passed. This city water temperature is generally between 70 degrees and 80 degrees in the summer. As the hot air from the Silica Gel bed is passed over this cooling coil, heat flows from the air into the coil and is carried off into the drain by the water.

In this process heat is actually removed from the air and the wet bulb temperature of the air is dropped. The air is next passed through an air washer where it is saturated at its new wet bulb temperature, and it is then ready for delivery to the conditioned spaces.

Suppose that we take air at 85 degrees D.B., 70 degrees W.B., and pass it through the Silica Gel. In passing through the Silica Gel, its wet bulb temperature remains constant, but its dry bulb temperature increases. Suppose that its dry bulb temperature increases to 110 degrees and its wet bulb remains at 70 degrees. At 110 degrees D.B. 70 degrees W.B., the dew point temperature of the air is approximately 45 degrees and its relative humidity is approximately 12 per cent.

Now this 110 degrees air is passed over a cooling coil whose temperature is held at 75 degrees by city water and its dry bulb temperature may now be reduced to 85 degrees. However, in this process only sensible heat is removed from the air and hence the dew point temperature of the air remains constant. Hence, we move horizontally along our psychrometric chart 110 degrees, 70 degrees, until we intersect the vertical 85 degrees dry bulb line. Now, we find that the wet bulb temperature has dropped to 62 degrees. Thus, the air is now at 85 degrees D.B., 62 degrees W.B.

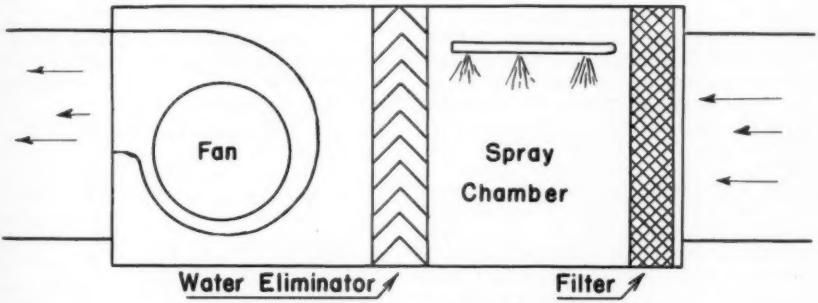


Fig. 2.—The essential parts of a spray cooling system

From here the air is next passed through an air washer where it is saturated at the wet bulb temperature of the air. We find this new point on our psychrometric chart by traveling obliquely up to the left along the 62 degrees wet bulb line until we intersect the saturation line. This 62 degrees D.B. 62 degrees W.B. air is then delivered to the conditioned space to pick up both heat and moisture before it is returned again to the system for conditioning.

After the Silica Gel has been in contact with moist air for sometime, it loses its ability to absorb moisture. Then it is necessary to heat up the Silica Gel to drive off the entrapped moisture. Gas is generally used to supply this heat.

(To be continued)

A Word About Tools

By H. D. BUSBY

IN our every day walk of life it is often said, "You can judge a man by the clothes he wears." In the refrigeration field we are more likely to say, "You can judge a man by the tools he uses."

If a man came to you or me asking for the opportunity of working either as a permanent employee, or if we happened to be prospective customers and he wanted to repair our refrigerators, it would be quite excusable if upon finding he had no more than a pair of pliers and a screw driver with which to work, that our estimation of the man's ability would be very low.

Likewise, if we were to walk into a shop where we anticipated having our refrigerator repaired and found there no more than a bench and a vise we would very likely walk out again and take our work elsewhere.

On the other hand, if a serviceman came into our kitchen lugging in a couple of boxes of tools and several testing machines, spreading them all over the floor, or if we found his shop so cluttered up with equipment that there was little room for him to work, we would probably consider him an outright nuisance so far as our kitchen was concerned and a man of little method or organization in his shop work.

This simile, of course, presents the extreme cases and it is not likely that such cases exist. It does, however, serve as a key to some of the requisites of good tools and shop equipment.

After giving the matter some thought, each one of us could probably lay out a set of rules for the selection and maintenance of tools and equipment. After we got through we would probably have a great variation of ideas and a formidable list with unlimited bounds.

It is not our purpose here to formulate any iron-bound rules, but merely to suggest some general points which should be borne in mind when selecting or maintaining the working equipment. These points are as follows:

1. The service kit and shop should contain sufficient tools and test equipment to handle each specialized operation and to make conclusive tests before and after repairs of each part of the system.
2. Each tool or test device should, if possible, serve two or more functions to facilitate the reduction in size of tool kit and keep the shop equipment at a minimum.
3. Tools should be kept to the minimum requirements for all practical purposes; particularly those carried to the customers' premises.
4. Test equipment should be chosen for the double purpose of performing one or more tests and as a means of impressing the customer.
5. Tools and equipment should be kept clean and in good repair so their appearance is as attractive as possible at all times. From the standpoint of impressing the customer, a coat of paint is as important to your test devices as it is to a new refrigerator.
6. Special equipment constructed in the shop should be built not only with a view to the practical purpose to which it will be put, but also should include eye appeal and the ability to impress the customer with as much spectacular demonstration as is possible.

   The greater percentage of both men and women with whom you will come in contact are sufficiently mechanical-minded so they will thoroughly enjoy an interesting mechanical demonstration. You can convert your test into an interesting demonstration if your test devices are attractive in appearance and include visual proof of what is happening during the test. Convert your simple routine tests to a dramatic and interesting show and you will immediately have an interested customer thoroughly impressed with your ability. Sales organizations have a name for this: it is called visual selling.
7. Portable test equipment used on the customer's premises should be combined so far as possible into one compact unit

rather than in several small instruments. Shop test instruments should be combined on one test board.

8. The layout and appearance of the shop should be such that it is not only an efficient work place, but also a show room which you are proud to show your customer. It, too, is part of your visual selling.

The refrigeration service industry is at present going through the same period the automobile industry passed through some years back, during which no specialized test equipment was available on the market and it was left to the individual shops to design and provide such tests as would meet their individual needs.

Progress in Auto Service

Most of us can remember the automobile mechanic who used a screw driver to test your spark plugs, or an old Ford vibrator coil to test your ignition. The man who would listen to the exhaust pipe and profess the ability of telling you whether the valves were bad or which cylinder was weak.

Some of us can remember what a calamity it was to meet with an accident in which the frame of the car was bent. It usually meant about a week's work and almost enough money to buy a new car. It meant stripping the car down to the frame, heating the bent portion to a red-hot heat, then coaxing the frame back into place with heavy hammers, crowbars, etc. Then, after it was done the car was considered not much good because the frame had been weakened due to the removal of the temper while heating.

The automobile mechanic of that day had just as much difficulty in convincing his customer and selling him a repair job as we of the refrigeration service have today, but look at what has happened in the automobile game today.

We drive our car into the modern garage of today and inform the white-coated attendant that the motor doesn't act right. The attendant rolls up an interesting-looking cabinet on wheels and connects it to various points on your motor. Within a very few minutes and with a little explanation from the attendant you may look at the various dials, gauges, etc., on the top of the cabinet and learn almost anything you want to know about your motor and its condition. It is not necessary that you take the attendant's word for it; you may see for yourself.

If your frame has been bent, you merely drive up on a steel framework, and it is hardly necessary to even shut off your motor or get out of the car. The frame of your car is clamped to the steel framework and within a very short time hydraulic jacks have gently pushed the bent portion of your frame back into line. After it is done the car is just as good as ever because no heat or hammering has been applied to the frame.

Master analyzers and special service equipment have made these and many other improvements in the servicing of the automobile. They have done an equal amount in the radio service field.

We, in the refrigeration service game, however, are still in the stage where practically no special equipment is available on the market. True, we can purchase various gauges and instruments also used in other fields which we can adapt to a few of our own needs, but these are usually lacking in something and do not fully meet our needs.

We Must Build

We cannot sit back and wait for some manufacturer to place something on the market which will meet our needs, because if we do, we will never get it. No one understands the problems of the service field quite so well as the service engineer himself and likewise no one will know what he needs in the way of special equipment quite so well as he does. Therefore, if we are going to reach the status of the automobile game of today it is up to us to dig in and start building.

Of course, many heads are better than one. One man's work may be slightly different from another's, and the scope of his test equipment will be limited to his own needs. By accumulating all the ideas of all the men engaged in all the different classes of work it is possible that at some future date we will be able to arrive at the perfect analyzer or the perfectly equipped shop which will meet the needs of all classes of work.

This is where our official organ, THE REFRIGERATION SERVICE ENGINEER, is endeavoring to do its small part. For the past year under the heading of "Service Kinks" many ideas have been published, nearly all of which are the contributions of those interested in improving their service methods and who recognize the fact that it is only through the exchange of ideas that improvements will be made and the ultimate ideal reached.

Some of the ideas published are the products of those in our own office, but even

these are usually born of the needs of the service engineers as expressed by them through the question box or other sources.

Of course, there are those who refuse to divulge their ideas because they might appear foolish, or too inconsequential. If the idea is practical and will serve some useful purpose, no matter how small, it is not foolish because it will always contribute something to the final aim.

Then, too, there are those who hoard their ideas because they feel they have something patentable or because they refuse to give their ideas away. In these cases it is interesting to note that the ideas are seldom, if ever, patented and manufactured. Probably because of a lack of sufficient funds to handle it or because the idea was not broad enough in scope to meet the needs of the majority and was therefore not saleable. The hoarders will probably go down in history as having contributed nothing to this particular field of endeavor and will probably wind up completely outmoded by better ideas formulated from the suggestions of many.

It is hoped that as time goes on, more and more service engineers will realize the advantage of pooling their ideas. By so doing, there is no doubt that the ideas of tomorrow will be better than those of the past because the old ideas are going to be improved on by someone, and several of them will be combined into one unit enlarging the scope of the new idea until eventually we may be able to say here is the perfect shop, or here is how the shop should be laid out and here is what it should contain.

It will be then that some manufacturer may take up the manufacture of the equipment we need because that equipment will be designed according to the accumulated ideas of us all and will be in sufficient demand to make its manufacture worth while. We will benefit by being able to purchase what we need at less cost than we can build it ourselves. First, though, it is necessary that each of us present our ideas to a central pooling place so that others may view them, improve on them and combine them until we reach the final product.

Refrigeration Equipment Manufacturers Association Holds Fall Meeting

THE Refrigeration Equipment Manufacturers Association held its two-day fall meeting at Turkey Run State Park, Indiana,

PRESIDENT J. S. FORBES

October 12 and 13. A representative attendance of the member companies was present to hear and discuss the several interesting papers presented.

The first day's business included a meeting of the Manufacturers-Jobbers Relations Committee, as well as the Exhibition Committee.

After the call to order by President J. S. Forbes of Pittsburgh, who, in turn, introduced E. A. Vallee of Automatic Products Company, Milwaukee, as Program Chairman, Mr. C. V. Gary, The Henry Valve Company, Chicago, presented a well prepared paper on "Selling Through a Manufacturer's Agent Set-up—Requisites and Limitations Thereof." The discussion on this very interesting paper was lead by Mr. David Daskal of Perfection Refrigeration Parts Company, Harvey, Illinois.

The second paper presented to conclude the afternoon's session was "This Parts Distribution Problem from the Unit Manufacturer's Angle," by Harold T. Hulett, General Electric Company, Bloomfield, New Jersey. This subject was divided into three

parts, and in addition to Mr. Hulett's paper included a presentation by Mr. J. M. Oberc, Jr., J. M. Oberc Company, Detroit, Michigan, whose subject was, "From the Wholesale Parts Jobbing Angle."

This provided such an interesting program that the Chairman had to close the discussion well after the time originally allotted for the presentation of these papers.

In the evening, the Coordinating Committee, representing the various associations that will participate in the convention in Chicago on January 15 to 18, met to arrange their tentative programs and to discuss general arrangements.

The second day's session was devoted to an interesting paper presented by A. B. Schellenberg, Alco Valve Company, Inc., Maplewood, Missouri, whose subject was "Manufacturers' Qualifications Under a Functional Classification Trade Policy." This discussion resulted in the appointment of several committees to consider further how the various manufacturing groups might determine the proper classification of various purchasing factors.

S S S

RAPID DRUM CHARGERS

The problem of finding an efficient method of charging small drums from large cylinders has been a hard one to overcome until recently when it was found that cooling the refrigerant before it entered the drum speeded up the work far beyond any other method ever used and eliminated all the waste and danger of the older methods.

For jobbers, distributors, ice cream companies or any concern transferring refrigerants, the new system is a time and money saver. It eliminates the necessity of purging from the drum being filled and heating the large cylinder to effect a transfer.

The charger shown on the front cover of this issue is manufactured by Superior Valve and Fittings Company of Pittsburgh, Pa., who have issued a bulletin—No. R11—covering the device in detail.

These chargers are made to accommodate two, three or four different refrigerants with an entirely separate cooler and circuit for each. In Fig. 1 it may be noted that the refrigerant from each cylinder passes through a filter first to catch any dirt or scale which might be contained in the inverted cylinder. From the filter the refrigerant passes through a bull's eye or liquid indicator, through a diaphragm packless valve, thence to the back of the panel in an insulated container.

From the cooler the liquid passes through the lower valve of each circuit; then through the charging hose into the drum being filled.

Each refrigerant has its individual circuit, and there is no mixing of the refrigerants. It is possible to transfer all four refrigerants at one time, because they have their own individual liquid cooler circuit.

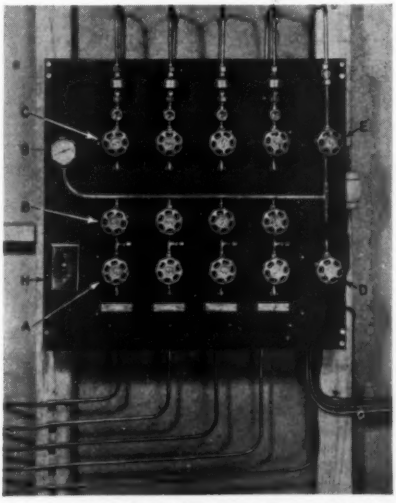


FIG. 1. PANEL BOARD OF RAPID CHARGER

The manifold above the center row of valves connects, on the lower side of the tee, to the suction inlet of the vacuum pump (see Fig. 1.) The discharge from the vacuum pump connects to the tee above valve E, which is in the discharge to the atmosphere circuit.

The condensing unit used in this installation is 1/6 h.p. capacity. A thermostatic expansion valve is used, and the temperature of the liquid coolers is regulated by means of a low pressure control on the condensing unit, which is set to cut in at 25 degrees F. and cut out at 10 degrees F.

When the unit is all set up for operation and the condensing unit has operated through at least one cycle (and this is for the purpose of chilling the refrigerant in the liquid coolers), the liquid flows very rapidly into the cylinder or condensing unit being charged. The average is 5 lb. per minute, and charging at this rate can be kept up all

(Continued on page 53)

SERVICE KINKS

Tools and Equipment You Can Build

Under this heading will appear simplified or short cut methods of performing individual service operations; also details of how you can build special tools and equipment for your own use. Readers are invited to submit information for publication under this head.

CORRECTION

ON Page 29 of the October issue, in the last sentence under the head "Electric Test Block" it was stated as follows: "With the switch in the on position the test prongs"—etc.

The sentence should read: "With the switch in the off position the test prongs" —etc.

Bottle Cooler Agitator

By HUGO PHEIN
Belleville, Ill.

WHERE trouble is encountered in beverage coolers due to a difference in temperature between the top and bottom of the water bath, one method of correcting it is as follows:

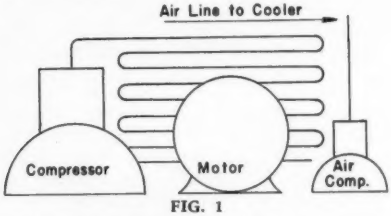


FIG. 1

Install a ¼-inch copper tube with several small holes drilled about a foot apart in the bottom center of the box. Loop the tubing upward to above the water line so water will not flow back through the tube; then connect it to a small air compressor as shown in Fig. 1.

A double pulley can be installed on the motor of the unit and the small compressor driven from the same motor as the refrigerating compressor; or if the air compressor can be mounted in such a manner it can be driven as an idler pulley.

A bubbler installed in this manner will keep the water agitated and maintain even temperatures between top and bottom of the bath.

Cleaning Coils

By L. K. ANNUMEN
Orlando, Florida

AS a means of cleaning coils where liquids must be forced through, I use a piece of three-inch pipe capped at each end and equipped as shown in Fig. 1.

The air line may be equipped with a tire valve and a hand valve used to create pressure. A refrigerant drum or an air compressor may also be used.

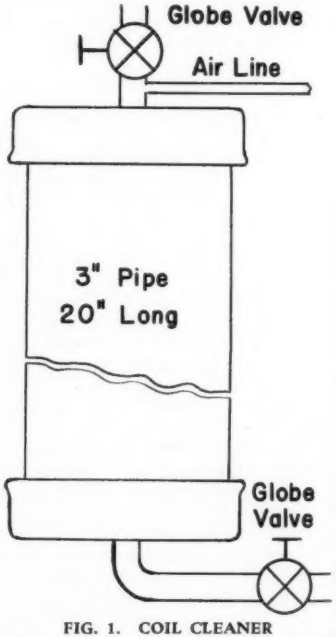


FIG. 1. COIL CLEANER

For cleaning the water tubes of water cooled condensers, I fill the pipe container with about two quarts of a 50-per cent solution of muriatic acid and water. Connect the bottom connection of the container to

the coils to be cleaned and then apply pressure. The solution is forced through the coil and caught in a container at the other end. The process is repeated until the coil is clean, then water is forced through to flush out the acid. The automatic water valve should be removed before cleaning is begun.

For cleaning air cooled condensers or evaporating coils the same method is used, forcing carbon tetrachloride through.

Separate containers should be used for the carbon tetrachloride and the muriatic acid so that no water will be introduced into the system.

Seal Holding Tool

By JACK JOSEPHSON
Bridgeport, Conn.

IF a lathe is a part of your shop equipment and you make your own seal repairs the tool illustrated in Fig. 1 will be found invaluable.

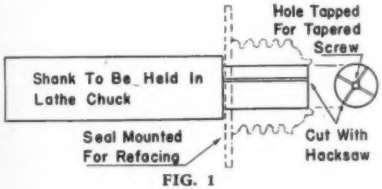


FIG. 1

Several sizes will be necessary to fit the different size seals. Make the tool of cold rolled round stock with a shank sufficiently long to be gripped in the lathe chuck. The end should be turned to fit the inside of the seal nose. Drill the center hole and tap it for a tapered screw before slotting the holder. If you cannot secure tapered taps and screws, use a tapered pin driven into the hole to expand the end of the tool.

The tool is very useful for filing, sanding or machining a new face on the seal nose.

Shaft Turning Tool

By JACK JOSEPHSON
Bridgeport, Conn.

IN order to avoid marring the shaft on a compressor when it becomes necessary to turn it while assembling, a special tool which will fit the shape of the shaft will be found useful.

Such a tool for Kelvinator, Frigidaire and other compressors having a 5/8-inch shaft can be made as illustrated in Fig. 1.

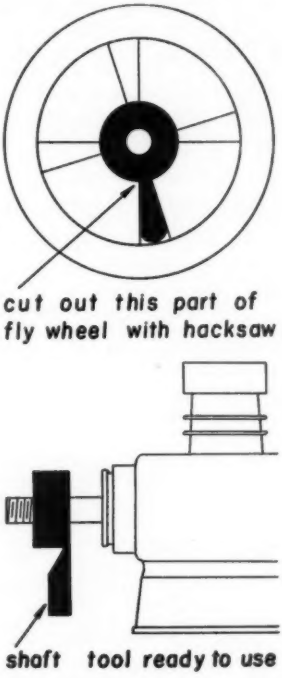


FIG. 1

Using a hack saw, cut out the hub and one spoke of an old wheel from one of the compressors mentioned, file off the sharp edges and the tool is complete.

Freeing Stuck Compressors

By CHARLES F. NICHOLS
Watertown, N. Y.

WHEN a reciprocating type compressor is stuck up *due to oil shortage,* and there is no vacuum present in the base, I first install my suction gauge, close the suction line to the compressor suction service valve, and then purge the line through the gauge to a container holding the measured amount of oil for that particular compressor. Then I remove the belt so that I can test the motor to make sure it will run. I shut off

the motor, replace the belt, and heat the cylinder walls with my blow torch (a Prest-o-lite torch can also be used) for about six or eight minutes. This heat expands the cylinder walls enough so the motor can turn the compressor for pumping a vacuum to pull oil into the base through the suction gauge assembly. Be sure to have everything in readiness to pump the oil as soon as the motor starts and the compressor is pumping a vacuum on the base.

S S S

Flash Light Accessory

A VERY useful accessory to your flash light is an extension cord with a bulb and socket small enough to be dropped through a 3/8-inch pipe plug opening.

Being able to see inside a receiver, the head of a compressor, the compressor crank case, or to be able to pass a small light through the opening in the end bell of a motor helps considerably in locating troubles or determining the internal condition of these parts. There are many other inaccessible places where such a light can be used to advantage.

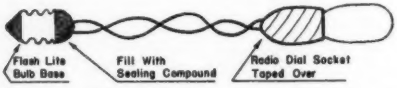


Fig. 1.—Flash light extension

To make one, use a burned out bulb from your flash light, break the glass away and solder an extension cord of any length desired to the filament leads in the bulb base. Heat some of the sealing compound from the top of a discharged dry battery and fill the space around the soldered connections as shown in Fig. 1. On the other end a radio dial socket and bulb may be used or the wires may be soldered directly to a flash light bulb.

The lens and bulb can be removed from your flash light and the extension screwed in place of the bulb.

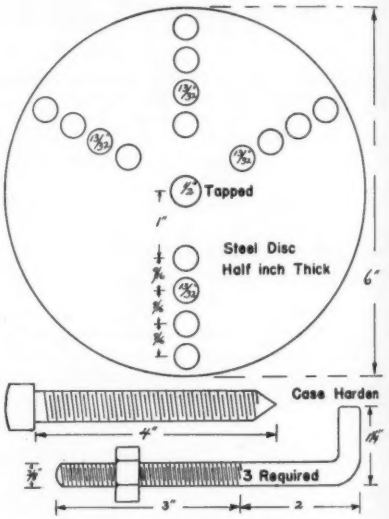
S S S

Wheel and Gear Puller

By JOHN ALDRICH
Massena, New York

THE accompanying illustration shows the details of a sturdy, serviceable wheel puller which can be made in your own shop.

The disc can be made of one-half inch steel and except for a neat appearance it is not necessary to machine it in a lathe if no lathe is available. This part may be cut with a hack saw in a square or hexagon



An easily constructed wheel puller

shape, as desired. The three hooks can be produced from 3/8-inch bolts six or seven inches long. The center screw is a four-inch cap screw or set screw pointed at the end and case hardened.

S S S

DID YOU KNOW—

THAT a Los Angeles service company offered locker service to a customer during the recent hot spell? It seems that Al Lafferty of Associated Refrigeration Service was way behind with his calls like everyone else. One customer was especially put out at having to wait because, she explained, she had just bought three chickens which would soon spoil unless he got a man there. Suddenly Al had a bright idea. He had a box running in his shop and if the lady liked, she could bring her chickens down there till a serviceman could get to her. She accepted the offer, Al stored the chickens, and chalked up another satisfied customer. Not bad, Al!

Reprinted from "The Liquid Line."

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment as well as oil burners to "The Question Box."

BUILDING AN OVEN

QUESTION 340: We are building an oven and would like to have your opinion of the following: insulation, construction, the best temperature and the heat control.

ANSWER: The insulation and construction of drying ovens will depend entirely on how much work you wish to put into such a piece of equipment. I have known a number of ovens to be built with no insulation and with merely a sheet iron construction. This, of course, is the simplest method of building one and works out satisfactorily, although possibly not as efficiently as an insulated oven. Ovens that you can purchase on the market are usually a double layer of sheet iron with space between which is filled with some insulation such as rock wool. Rock wool, of course, is the best for this type of work since it will not be affected by the higher heats.

I believe the simplest kind of construction for an insulated oven is to use the single sheet iron liner with asbestos covering put on in much the same manner as a steam boiler or hot water boiler may be insulated. Temperatures that it will maintain will be in the neighborhood of 200°.

Gas or electricity may be used as a heating medium, depending on which is cheaper in your locality. Satisfactory burners for these ovens can be secured from gas or electric kitchen ranges. You can use two or more burners, depending on the size of the oven. Likewise, the controls can be secured from one of the stove companies, and if you are going to use gas, which is quite probable, I would suggest that you use a Lorraine or Robert Shaw gas control similar to the type used on kitchen ranges.

MOVING CROSLEY TO BASEMENT

QUESTION 341: Will I have any trouble in operation after putting the condensing unit of a Crosley refrigerator in the cellar? This unit uses a capillary tube as an expansion valve. The unit is at present on top of the box. When the unit is placed in the cellar it will be about eight feet below the evaporator.

ANSWER: I don't believe you will experience any trouble in installing the condensing unit of the Crosley refrigerator in the basement—particularly when there will be only eight feet of space between the two.

In doing so, however, I believe I would arrange to install the capillary tube upon, or very close to, the evaporator since the expansion of the gases begins at the outlet of this capillary tube and if it were installed with the machine you would have a certain amount of refrigeration in the liquid line from there to the evaporator and a consequent loss in refrigeration.

MULTIPLE INSTALLATION

QUESTION 342: I was called in to service a Brunner R-650 unit that is connected to a system of twenty-five 5-cu. ft. refrigerators. This is a water cooled unit. The compressor was installed about eight months ago and ran satisfactorily until about two weeks ago, when a discharge valve began to leak and was repaired in a makeshift way which ruined the seat.

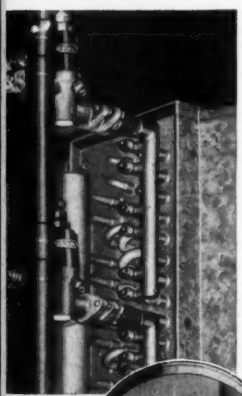
I installed a new valve plate and added methyl chloride to the system until I obtained a horsepower of 110 pounds. When the weather gets warm the unit runs continuously but when the weather gets cool, as at night, the unit will shut on and off.

I would like to know if this unit has a sufficient capacity to take care of twenty-five 5-cu. ft. refrigerators in summer weather and, if not, please let me know what size water cooled job I would need and how many boxes of 4 or 5-cu.ft. size can be placed on a ½-hp. water cooled job. The boxes are refrigerated by Fedders two-tray direct expansion evaporators. Thermostatic expan-

Announcing

THE NEW FEDDE

Now Makes It Possible To Adjust Fedders New Staggered Tube Air Conditioning Coils To Obtain The Correct Superheat For Maximum Effiicency



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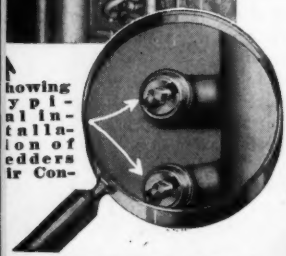

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Finger tip turns thermometer tube for easy reading.

Showing how Fe
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Heavy metal sleeve protects thermometer tube. Can be rotated for reading from any angle.

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Thermometer reads from 0° to 120° F. in one degree graduations.

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Flow Control Valves are easily adjusted by means of ordinary ratchet wrench.

Copper contact button in casing gives quick heat transfer to thermometer bulb.

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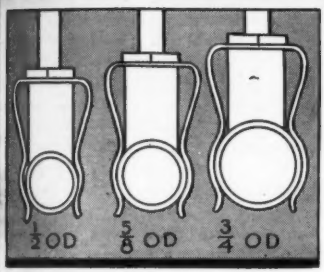
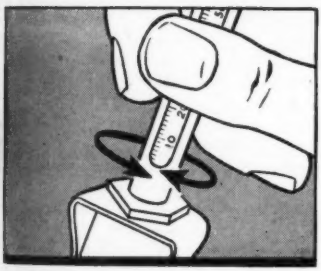
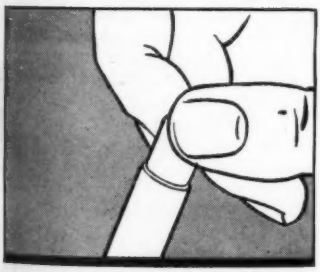
Spring clips fit ½, ⅝ and ¾ inch O.D. tubing—no adjustment necessary.

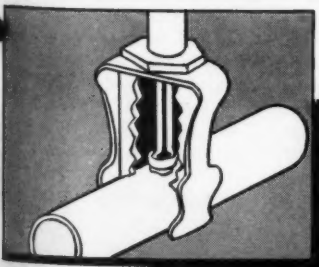
EIS *Clip-on*

SUPERHEAT THERMOMETER









WHAT IT IS

Fedders Clip-On Thermometers give refrigeration men a quick, accurate means of checking and adjusting superheat. It is a strong, serviceable, self-contained device which can be instantly clipped on to ½, ⅝ and ¾ inch O.D. tubes. Thermometer tube is adjustable for easy reading from any angle.

WHAT IT DOES

It makes it possible to *check superheat* of direct expansion *air conditioning coils* at suction end of each circuit of coils *thus assuring correct setting of each Fedders flow-control refrigerant valve* for *maximum efficiency* throughout the entire coil.

Fedders Clip-On Thermometer also provides an accurate check of setting and operation of Thermostatic Expansion Valves for superheat. Temperature of high pressure liquid entering expansion valve can also be checked . . . this combined with head pressure and reading of evaporator temperature makes it a simple matter to obtain amount of liquid to produce each ton of refrigerant.

Temperatures of inlet and outlet water circulating through water type air conditioning coils can also be readily checked.

Write today for your personal copy of Bulletin 392-A

FEDDERS
MANUFACTURING CO.
BUFFALO, N. Y.

Atlanta Boston Chicago Cincinnati Dallas Los Angeles New York Philadelphia

sion valves are used as the regulating device.

ANSWER: You state that the unit you are interested in is a Brunner R-650 and later on you ask how many boxes can be installed on a ½-hp. water cooled unit. I am not sure whether you mean by this that the R-650 is a ½-hp. job, and a search through all the material I have on hand does not show the model R-650. Therefore, I am at a loss to know what size unit you are dealing with.

Apparently, however, from the information you have given me, the unit is too small for the number of boxes being handled, and I am also inclined to believe the head pressure you have is too high. I cannot be sure on this point, however, without knowing some of the other data such as the temperature of the water passing through the condenser and the back pressure being maintained. Then, again, the high head pressure might be due to an overload on the unit or to too much refrigerant in the system.

The number of cabinets that can be installed on water cooled units of various sizes is shown in Table 1. You will note that this data is based on the assumption that cabinets contain 1½ inches of cork or its equivalent and that the maximum room temperature in which the cabinet is installed does not exceed 90° F.

The general conditions are average, and I believe this table should be of value to you.

TABLE 1—Number of Cabinets to be Installed on One Water Cooled Machine

Cu. Ft. of Cabinets	⅓	½	¾	1	1½
4	8	13	20	25	33
5	6	11	16	20	26
6	5	9	13	17	22

1½ inch cork or its equivalent in cabinets.
For 2-inch insulation add 20% to tables.
Table based on maximum room temperature of 90° F.

OILY MASS CLOGGING VALVES

QUESTION 343: The writer has heard several times that if CO_2 gas is used to blow out a Freon gas job it is very dangerous as it causes an explosive gas which will blow up under certain conditions.

On several occasions on Freon low temperature jobs where a permanent dryer filled with activated alumina was on the job over twelve months I found screens of expansion valves plugged up with a heavy oily mass which completely evaporated after exposed to air for about one-half hour. I have been unable to get this analyzed by a chemist as it disappears too quickly.

ANSWER: We referred your question to Mr. R. J. Thompson of the Kinetic Chemicals Co., and he has replied as follows:

"Carbon dioxide (CO_2) may be used with complete safety to remove the refrigerant Freon-12 (CCl_2F_2) and oil from a system or to test lines for leaks before adding Freon-12 for the reason that both CO_2 and Freon-12 of themselves or in mixture are non-explosive and non-flammable. We refer you to the Department of Commerce, Bureau of Mines Report, R.I. 3042 wherein data is given as to the non-flammable and non-explosive properties of these two compressed gases.

"The party who raised this question has evidently confused such mixtures with oxygen (O_2) with oxygen oil mixtures which are explosive. Oxygen should never be used to blow out any system or for testing for leaks as oil, grease or other readily combustible substances may be present with resulting violent explosion. We refer you to the pamphlet entitled, 'Safe Handling of Compressed Gases' published by the Compressed Gas Manufacturers' Association and especially to Pages 5, 6, 8, 9, 12 and 13.

"When blowing out systems or testing lines for leaks we suggest the use of CO_2 or nitrogen and then purge all of the gas from the system after adding the Freon-12; otherwise the test gases will act as non-condensibles and cause high head pressure, high operating costs and losses in efficiency.

"The deposit which was found on the screens of the expansion valves was simply an emulsion of Freon-12, oil and an extremely high percentage of water which if exposed to atmospheric pressure would disappear or evaporate. The type of dehydrating agent or the length of time the dehydrator was in the line was not responsible for the deposit and it is quite evident that the amount of dehydrating agent used was entirely too small for the amount of water in the system; otherwise the water would have been absorbed and retained by the activated alumina."

UNBALANCED SYSTEM

QUESTION 344: Will a compressor with a B.t.u. capacity of 3620 at 20° gas temperature, hooked to a blower coil that has a B.t.u. capacity of 13,100 at a 20° temperature difference between the air and refrigerant, operate satisfactorily in a walk-in cooler 8x9x8, with three inches of insulation? Desired temperature is 37° F.

The machine short cycles very badly. All

the valves are holding all right with the exception of the thermostatic expansion valve, in that when the valve is opened wide enough to completely refrigerate the coil it will not shut the refrigerant off after the right temperature has been reached and the compressor has stopped. This valve can be shut down tight by manual adjustment and the thermal bulb responds to heat when it is held in the hand.

ANSWER: Your question has me somewhat puzzled and I am wondering if you have perhaps made some mistake in the data you have given me.

In the first place, this box, according to my figures, will require about a ½-hp. water cooled machine or a ¾-hp. air cooled machine to operate it, whereas you state the unit installed has a B.t.u. capacity of 8620, which is approximately equivalent to a ⅓-hp. unit. This indicates, of course, that the unit is considerably undersize.

On the other hand, you state the coil has a capacity of 13,100 B.t.u. and this is considerably oversize in comparison to the requirements of the box.

If the above data is correct the system operating with such an undersize compressor would cause the machine to run almost continuously. However, you state the machine runs on very short cycles, and the rest of the information you give me would tend to indicate that the machine is oversize rather than undersize. All of this hardly makes sense.

If I assume that a typographical error was made in stating the size of this compressor and that the size should be 13,620 then the logical solution to your problem is that the entire job is oversize and the condition you have at present is a logical result.

Again assuming that the unit is oversize, I would think that your only remedy at this time would be reducing the speed of the compressor about one-third of its present rating.

The symptoms of trouble you have described indicate in every respect that the unit is oversize; but if my assumptions are not correct, I would be glad to hear from you further.

REFRIGERATING AN ICE HOUSE

QUESTION 345: Will you please send me information on how many feet of 1¼-inch pipe I will need for a cooler 18 x 19 x 8 feet with six inches sawdust on wall and 12 inches on ceiling? This cooler is to store ice at a temperature of 30°. What size ammonia machine would it take?

ANSWER: Since you have not informed me whether or not the floor of this ice cooler is insulated I have had to work on the assumption that there would be 12 inches of sawdust on the floor as well as in the ceiling.

Therefore, according to my figures, the total heat loss in this box—based on a 90° maximum outdoor temperature and a 30° inside temperature—would be 5,000 B.t.u. per hour. Since you will require the machine to operate not more than 16 hours per day, it will be necessary to secure a machine with a capacity of 7500 B.t.u. per hour.

I have worked on the basis that you will operate your machine on a 5° suction gas temperature, which will give you a temperature difference of 25° between the gas in the coil and the air circulating over it.

Under these circumstances you will get a "K" factor of about 62 B.t.u. per square foot of coil per hour. And converting this to the surface required you will need 121 feet of coil surface installed. If you are going to use 1¼ inch pipe for this coil you will require about 280 lineal feet.

All of these figures are based on the coefficient of heat transfer through dry sawdust. The factor used is one for average conditions but will not hold true for sawdust which contains moisture.

If the space to be refrigerated is of old construction or if it is of new construction but not very well shielded from moisture, it is very probable that the insulation contains considerable moisture now or will absorb moisture after a comparatively short period of service.

Under these circumstances, the heat loss through the walls would increase quite rapidly and I would advise adding about 50% to both your machine and coil capacity to take care of this condition.

ASSEMBLING JOINTS

QUESTION 346: I have some questions to ask which are only regarding the different ways of doing things, but I think there is a better way to do all things so wish to have your opinion regarding them.

I usually cover gaskets with a light coating of refrigeration oil when assembling the gaskets. I do not know if this is proper or not, but I have never had any trouble doing it.

In assembling threaded joints in refrigeration work is it better to screw them together

dry or to use a compound on the threads, and if a compound is used what is best to use?

In assembling joints using gasket material of lead, or lead compounds, and asbestos is it better to assemble them dry or use a compound on them, and if so what should be used?

In my last letter I asked for the foolproof hook-up of two compressors to one cabinet —one only to be used at a time but each with a different motor so that one could be run on one power when it was available and the other the rest of the time. You made a good suggestion which would not be complicated at all. I would like to know if you can tell me the proper way to connect the two compressors to the case so that one would act as a spare in case of trouble with one? Would there be danger of robbing one compressor of the refrigerant when changing if not watched?

ANSWER: In assembling thread joints in refrigeration work it is better to screw them together with a compound, being careful in the process not to get any of the compound on the end of the thread so that it may be washed into the system. The compound usually used for this purpose, is litharge and glycerine, which may be secured from your local jobber or from the corner drug store.

In assembling joints using gasket materials of lead, copper, zinc or aluminum it is seldom necessary to use any compound or oil on the surfaces. Asbestos or fibre gaskets, however, will usually require a coating of oil, which tends to soften them up before assembling.

I believe it is quite general practice, however, to use oil on any type of gasket and so far as I know there is no harm in doing so.

With regard to foolproof hook-up of two compressors on one cabinet, a similar question was answered in THE REFRIGERATION SERVICE ENGINEER in the July 1938 issue.

COLDSPOT TROUBLES

QUESTION 347: I have a 1934 Coldspot which has caused me quite some trouble. I have replaced the expansion valve with a new Detroit, a new Rancostat, and also installed a ⅜-inch Kerotest check valve in the suction line just before it goes through the insulation. I have not removed the old check ball. Have put in a fresh charge of oil and refrigerant.

By controlling the expansion valve I can get the frost line just past the sump in back of the evaporator, but the metal ice cube compartment at the back is very slow in freezing.

I had the unit in the shop and the evaporator wrapped in newspaper for insulation and it worked perfectly, but when I replaced it in the cabinet it would not freeze except for about two feet of coil from the expansion valve. The valve setting has not been changed.

It seems to me that while the coils are frosted the unit will operate but as soon as the coils are defrosted it will not refrigerate.

From the above information, could you give me some clue to my difficulties and how they may be overcome?

Improper Adjustment

ANSWER: There is one of two things that may be the cause of the trouble you are having with the Coldspot refrigerator.

The first is that you may have too much oil in the system or that the oil has accumulated in the evaporator and is not returning properly. This, however, is probably a remote possibility, and I believe that your trouble is more likely due to an improperly adjusted expansion valve.

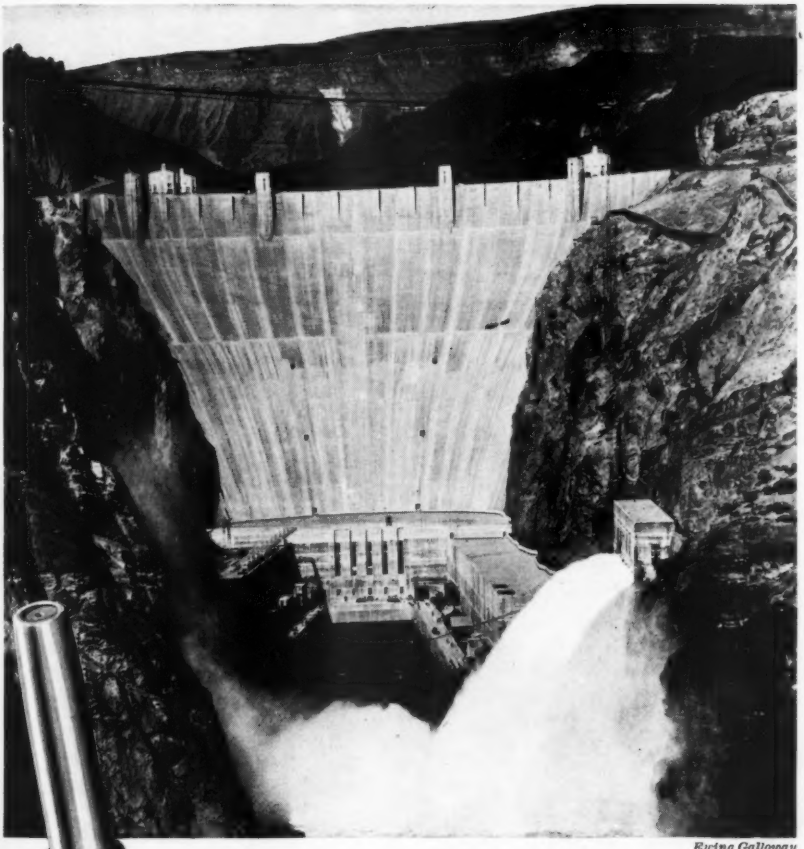
The fact that you are endeavoring to get frost beyond the sump tank or the accumulator leads me to believe that the expansion valve is not properly adjusted. The primary purpose of this accumulator is to prevent any liquid refrigerant passing beyond this point and, therefore, the expansion valve should be adjusted so that frost reaches it about the end of the operating cycle but never passes beyond it.

The proper method of adjusting the expansion valve in these units is through the use of a thermometer frozen in to the bottom of the tray compartment in the evaporator so that a true temperature may be obtained. The expansion valve is then reduced until the evaporator temperature is somewhere between 2 and 6°. Of course, as you know, the lower the temperature the lower pressure required passing through the expansion valve.

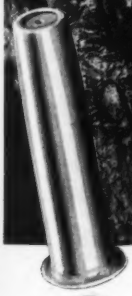
I believe you will have better results by utilizing the old check valve in the system rather than installing a second one as you have done, because undoubtedly the addition of another valve in the system would create more resistance to the flow of gas and would probably reduce the efficiency of the unit.

For your information, complete service instructions on the Coldspot refrigerator are contained in the May and June, 1938 issues of THE REFRIGERATION SERVICE ENGINEER.

ORIFICE CARTRIDGES
MEAN CAPACITY CONTROL



Ewing Galloway



MILLIONS of TONS OF WATER would be WASTEFUL and DESTRUCTIVE UNLESS CONTROLLED.

IN your REFRIGERATION SYSTEM, a SUDDEN and UNCONTROLLED SURGE of LIQUID REFRIGERANT is JUST AS COSTLY. PEERLESS THERMOSTATIC EXPANSION VALVES, WITH the PROPER ORIFICE CARTRIDGE, METERS THE REFRIGERANT CORRECTLY to insure MAXIMUM EFFECTIVE COIL SURFACE. Less surface is wasted in picking up superheat. MORE efficient REFRIGERATION is accomplished with LESS RUNNING TIME and STARTING POWER. Ten interchangeable orifice cartridges permit matching the valve to the coil in your system.

STOCK IN ALL PRINCIPAL CITIES. SEE YOUR REFRIGERATION PARTS JOBBER.

SEE OUR DISPLAY AT BOOTHS 123, 124, 125 SECOND ALL-INDUSTRY EXHIBITION. JANUARY 15-18, HOTEL STEVENS, CHICAGO

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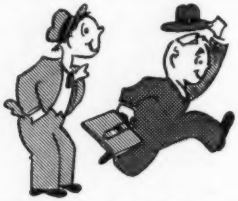
REFRIGERATION SERVICE ENGINEERS' SOCIETY

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.

On to Chicago

PREPARING for the big event in Chicago—January 15th to 18th—the convention committees are already at work planning the educational and entertainment programs that will constitute the Sixth Annual Convention of the Refrigeration Service Engineers Society. The general convention committees were announced in the last issue of THE REFRIGERATION SERVICE ENGINEER, and much preliminary work has been accomplished since that time.



Don't stop me, I'm due in Chicago Jan. 15.

Annual conventions of the R.S.E.S. provide the opportunity for members and all service men to check on developments and, most important, to check on whether individually we are keeping pace with the current developments that are rapidly taking place in the industry. Attendance at the R.S.E.S. conventions is a good investment for the future success of your individual advancement.

We're on our way.

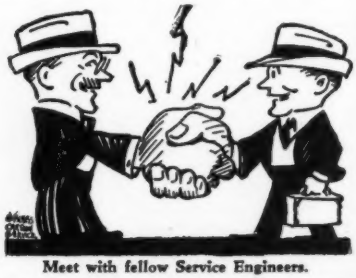
Each year witnesses the growing importance of the educational programs of the R.S.E.S., and plans for the Sixth Annual Convention indicate that it will exceed any of the previous meetings. Interesting and informative discussions on subjects of the utmost importance to you will be discussed from the practical side.

The Stevens Hotel will be the official convention headquarters, and rates in this hotel and neighboring hotels will be in line with the pocketbooks of those attending.

The most important thing is to plan your attendance at this convention at the present time.

The Manufacturers Exhibit

The Sixth Annual R.S.E.S. Convention is being held in conjunction with the Second All-Industry Refrigeration and Air Conditioning Exhibition sponsored by the Refrigeration Equipment Manufacturers Association. Approximately 150 exhibits—the largest exclusive refrigeration exposition under one roof—will be an outstanding educational feature.



Meet with fellow Service Engineers.

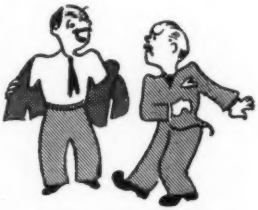
Here will be displayed the products you are using in your everyday work, with qualified factory engineers in attendance to answer any of your field and shop questions.

The exhibit will contain the principal manufacturers of refrigeration equipment, accessories and supplies. R.S.E.S. meetings are planned to provide ample time to carefully inspect each exhibit. It will be a liberal education in "What's New" in the industry

and the improvements that are being made in present equipment.

The Entertainment

For your enjoyment and relaxation enjoy the annual banquet on Tuesday evening. It will be an All-Industry affair with headline talent. It is the evening planned to "let down your hair."



We'll get down to facts.

Also on the program will be the R.S.E.S. get-together party on Wednesday evening.

All of these events are being provided so as to make your Chicago visit a memorable one.

Bring the Ladies

Of course the ladies are expected! They are an increasingly important factor in R.S.E.S. meetings. Special events will keep them busy during the day, and all of the evening events are planned for their enjoyment.

Sit down right now and promise yourself that you will be in Chicago—January 15th to 18th. Remember, this invitation is extended to all refrigeration service engineers, and the R.S.E.S. extends on behalf of its members and the exhibition as a whole an invitation—whether a member or not.

THE NEIGHBORS By George Clark

"I warned you when you started joining things we'd come along when you attended conventions."
(Reprinted from Chicago Tribune)

New Chapters Being Formed

OTTAWA, ONTARIO, CANADA

ON October 26th a group of 25 men gathered together for the purpose of discussing the advisability of organizing a chapter of the R.S.E.S. within the city.

Mr. Harry S. Parish of the Ontario Forest City Chapter at London, Ontario, attended as the organizer and temporary chairman of the meeting. After explaining the purposes of the organization and benefits to be derived from membership therein, it was unanimously decided to form a chapter to be known as the Canadian Capital Chapter.

Future meetings of the new chapter are to be held on the first Monday and third Friday of each month, and since no permanent meeting place has been selected as yet, members will be notified prior to each meeting.

An election of temporary officers then took place, with the following results: *President,* Cliff Pinke; *Vice-President,* Harvey Boyle; *Secretary,* Hilton Arthur; *Treasurer,* Wilfe Lowry; *Sergeant-at-arms,* William Podd; *Directors:* E. Hill and K. R. Mather.

A petition for charter was drawn up and many signatures applied thereto. Formal application will be made at the next meeting.

PHILADELPHIA

On Monday, August 10th, ten men met for the purpose of forming a chapter, which will be known as Philadelphia Chapter.

Mr. Fred H. Grant, member-at-large,

(Continued on page 42)

ILLINOIS STATE ASSOCIATION HOLDS SECOND ANNUAL MEETING

The Illinois State Association of the Refrigeration Service Engineers Society held its second annual meeting in Rockford, Illinois, on November 4th and 5th.

The meeting came to order with preliminary introductory addresses and the appointment of convention committees at 10:30 a.m. November 4th.

It was then adjourned until 2:30 p.m. when the educational program took place, followed by a business session during which the election of officers was held. Those elected were: R. C. McCarthy, *President;* C. L. Hartman, *1st Vice-President;* R. M. Potter, *2nd Vice-President;* E. H. White, *Secretary;* A. D. McGill, *Treasurer;* Floyd Duvall, *Sergeant-at-Arms.*

As specified by the By-Laws of the Association, each chapter will be requested to elect one member to serve on the Board of Directors.

During the evening of November 4th, the annual banquet of the Association was enjoyed by all of those in attendance at the meeting. The picture on the left-hand side of the page was taken while the banquet was in progress. Turkey and all the trimmings were served for dinner and several acts of entertainment provided the amusement. Following the banquet the floor was cleared and dancing to the music of a local orchestra was continued until about 4 a.m.

On November 5th the meeting came to order at 11:30 a.m., with the new President, R. C. McCarthy, presiding. An interesting feature of this session was a talk by Mr. V. M. Lathers of the Barber-Coleman Company of Rockford, Illinois on "Engineered Air Distribution."

Following the educational program, a short business session was held and the report of the Resolutions Committee received. The meeting was adjourned about 2 p.m.

Among those actively engaged in the arrangements and procedure of the meetings were those pictured above. From left to right in the back row are Mr. E. J. Seaton, President of the Rockford Chapter; E. H. White, Secretary of the Illinois State Association; Front Row: R. C. McCarthy, President of the Illinois State Association; C. A. Brunton, National President; L. C. Nelson, Past-President of the Illinois State Association and President of the Mississippi Valley Chapter.

FOR PEAK PERFORMANCE

PUT IT UP TO PAR

CLOSE-COUPLED CONDENSING UNITS

YOU KNOW what it means to install equipment with plenty of reserve capacity—with durability and stamina to "stay in there and pitch" . . . That's why you'll like PAR Units. They are carefully built for long-haul, economical service that will please your customers and reduce service expense.

PAR Condensing Unit illustrated above is supplied in two sizes—1/4 and 1/3 H.P. models. Its unusually compact arrangement makes it ideal for portable ice cream cabinets, self-contained food cases and reach-in coolers.

Send for FREE CATALOG

or see PAR units on display at your jobbers.

MODERN EQUIPMENT CORP., Defiance, Ohio

acted as temporary chairman during the meeting and provided those present with all the desirable information regarding the Society and its aims.

A formal application for a charter was drawn up and several signatures affixed thereto and after some discussion it was decided that meetings would be held on the second Monday of each month. Election of temporary officers resulted in the following: *President,* F. H. Grant; *Vice-President,* J. Keers; *Treasurer,* J. Earle; *Secretary,* J. Harkins.

While the attendance at this original meeting was small every effort is being made to contact each individual engaged in refrigeration work in the vicinity, and an official invitation is hereby issued to these men to attend the next meeting which will be held November 18th.

GRAND RAPIDS

On October 26th a meeting of service men was held in Grand Rapids to discuss plans for the formation of a chapter in the territory of Grand Rapids. Mr. Willis Stafford, member of the Board of Directors of the R.S.E.S., presided over the meeting as temporary chairman and explained the aims and purposes of the Society and some of the benefits of membership.

Following a decision to apply for a charter, temporary officers were elected and plans for the chapter formation were begun. Those officers elected were as follows: *President,* Wm. Wilbur; *Vice-President,* R. P. Wooden; *Secretary,* A. E. DuMonte; *Treasurer,* K. L. Harvey.

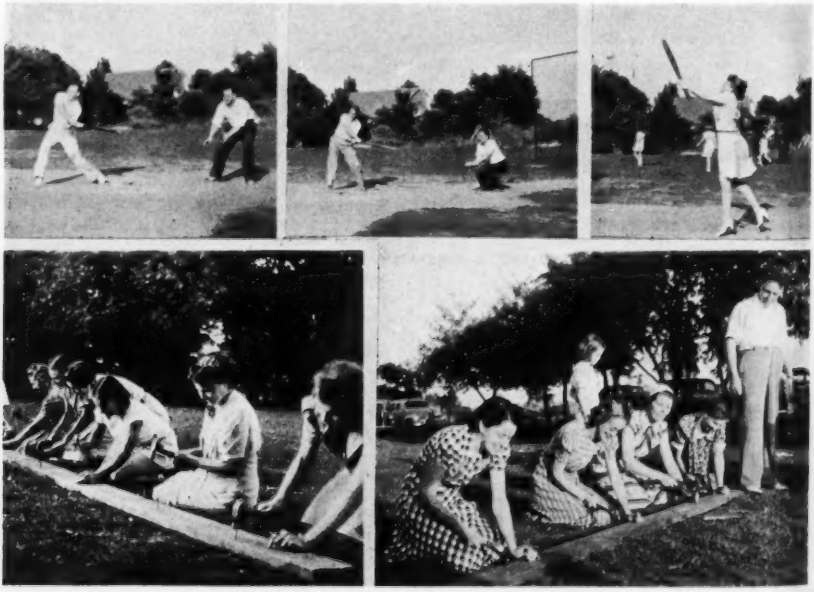
The next meeting will be held on November 9th and all refrigeration men are invited.

LANSING

Mr. Willis Stafford conducted a meeting in Lansing, Michigan, on October 27th at which a representative group of the district was in attendance. After some explanations by Mr. Stafford on the purpose of the meeting, it was decided that a chapter be established and that application for a charter be made.

Temporary officers include: *President,* O. S. McGuffey; *Secretary,* K. D. Hamilton; *Treasurer,* W. E. Anglin.

All refrigeration men are invited to attend the next meeting to be held on November 18th.



VIEWS OF THE TRI-COUNTY CHAPTER PICNIC

In the upper row of pictures from left to right are: First—Willis Stafford about to make contact. Second —Gene White swinging a hay-maker. Third—One of the ladies trying her hand at the bat. In the bottom two views the ladies are seriously engaged in a nail driving contest.

Insist on Activated Alumina in Dehydrators

Dehydrators may look exactly alike, but results depend on the drying agents inside. Get the drying agent that catches and holds moisture dependably. Ask for Activated Alumina.

Activated Alumina can be used with all refrigerants. It actually takes moisture out; it is not an anti-freeze. In addition, it removes acid, thus preventing further dilution and decomposition of the refrigerant, and corrosion of the mechanism. Activated Alumina does not soften, swell, or dissolve.

Leading manufacturers make dehydrators and replacement parts for use with Activated Alumina. You can get these supplies from your jobber. When you buy, specify "Activated Alumina." ALUMINUM ORE COMPANY. (*Sales Agent:* ALUMINUM COMPANY OF AMERICA, 2159 Gulf Building, Pittsburgh, Penna.)

These Manufacturers Supply Dehydrators Charged with Activated Alumina

•

American Injector Co.
Fedders Mfg. Co.
Henry Valve Co.
Iceless Refrigeration Accessories Inc.
Imperial Brass Mfg. Co.
Kerotest Mfg. Co.
McIntire Connector Co.
Mueller Brass Co.
Perfection Refrigeration Parts Co.
Cyrus Shank Co.
Universal Cooler Co.
Weatherhead Co.

ALORCO
Reg. U. S. Pat. Off.

ACTIVATED ALUMINA

CURES CLOGGED REFRIGERATOR VALVES

NEW
HEAVY DUTY
COMMERCIAL
CONDENSING
UNITS

ENQUIRE AT YOUR NEAREST JOBBER

TECUMSEH PRODUCTS CO., TECUMSEH, MICH.

CENTRAL INDIANA CHAPTER PLANS

PLANS are going forward at a rapid rate for the bang-up meeting of Central Indiana Chapter to be held on Friday, November 24th.

Everyone connected with the refrigeration industry in the territory is being invited to attend and it is expected that this will be the prize meeting of the chapter's history. Arrangements are being made for interesting speakers to appear on the educational program and there will be entertainment and refreshments of a kind that everyone will enjoy.

Among the visitors who have accepted invitations to attend is Mr. Willis Stafford, member of the Board of Directors of the National Society, who will endeavor to acquaint the visitors with the aims and purposes of the organization.

While invitations are being sent to all those in the district it is possible that some may not receive these invitations due to changes of address, etc., and if such is the case they are urged to attend without further request.

ADDITIONAL CONVENTION COMMITTEE APPOINTMENTS

IN addition to the General and Program Committee appointments announced in the October issue, President Claude Brunton has made the following additional committee appointments:

Mr. Warren Farr of Cleveland, Ohio, has been appointed to the General Convention Committee, and Messrs. E. W. McGovern of Wilmington, Del., and Paul Reed of Evansville, Ind., to the Program Committee.

S. A. LEITNER REPORTS ON CHAPTER ACTIVITIES

IN a recent report received from Mr. S. A. Leitner, treasurer of the National Society, and member of Kansas City Chapter, he states that he has just completed a tour of western chapters, Lincoln Chapter being the first on his schedule.

Mr. Leitner stated that presentation of the charter was made at this time and that an election of permanent officers to carry on for the balance of the year took place. There were five members from the Omaha chapter

300,000,000 lbs.
MUST be right
RS-6-9
• At the least, Ansul estimates, 300 million pounds of liquefied sulphur dioxide have been shipped and used for refrigeration purposes in the last 20 years. What better recommendation could anyone write for the best refrigerant for household units yet developed?
ANSUL SULPHUR DIOXIDE
EACH CYLINDER INDIVIDUALLY ANALYZED
ANSUL CHEMICAL COMPANY, MARINETTE, WIS.
THE JOBBER WHO WORKS FOR ANSUL WORKS FOR YOU

as visitors, who aided considerably in the presentation and election. The new officers are: *President,* T. M. Duffield; *Vice-President,* L. B. Eiche; *Secretary-Treasurer,* J. E. Cole; *Sergeant-at-arms,* E. L. Bowen; *Director,* F. E. Schmidt.

The next on his tour was Omaha, where an interesting get-together was arranged among the officers of the chapter with Mr. Leitner offering many helpful suggestions in chapter management and the organization of interesting programs.

From Omaha, Mr. Leitner proceeded to Cedar Rapids, where an exceptionally interesting meeting was held during which Mr. Leitner presented the charter to the chapter.

The educational program, after the presentation ceremony had been completed, included Mr. Bud McKee and Mr. Page of the Detroit Lubricator Company, and Mr. C. E. Johnson of Peerless of America, who gave instructive talks, including many suggestions on operating a chapter.

The next stop was Sioux City, where again a meeting was held primarily for the purpose of presenting the charter to the chapter. The balance of the evening was devoted primarily to discussions of benefits to be derived from membership in the Society and to helpful suggestions to the officers on chapter management and the arranging of educational programs.

Chapter Notes

Under this heading will appear news of the chapter meetings. For names of the officers and dates of regular meeting nights, please refer to the Chapter Directory.

ILLINOIS VALLEY CHAPTER

October 20th—As a visitor for the evening, the chapter welcomed Mr. Willis Stafford, member of the National Board of Directors, and Regional Director of the territory. Mr. Stafford spent considerable time during the evening outlining the progress made in plans for the 1940 national convention and what the National Society is endeavoring to do toward helping the local chapters. After the meeting was adjourned, Mr. Stafford met with the Board of Directors to whom he offered many helpful suggestions on the management of the chapter and its educational meetings.

KANSAS CITY CHAPTER

September 26th—Since this was an open meeting at which many visitors were present,

Snap-on
SPECIALIZED TOOLS
FOR REFRIGERATION SERVICE

Broken bolts, screws, and studs can now be removed in a few minutes with the aid of Snap-on's Screw Extractor Set No. 1020. These tools have straight fins which not only grip without reaming or slipping, but prevent expansion and binding of the broken stud . . . No. 1020 Standard Set extracts to a depth of 1". Complete set includes 5 extractors, ¼" to 9/16", 5 special drills, 10 drill guides, and extractor wrench, all packed in a sturdy metal carrying case . . . see Snap-on Tools Corporation in your telephone directory or write for catalog.

1. *Small hole drilled into broken screw.* **2.** *Hole is enlarged to proper size to receive extractor.* **3.** *Drill is removed . . . extractor is then driven in and broken screw quickly turned out.*

SNAP-ON TOOLS CORPORATION
KENOSHA **WISCONSIN**

Snap-on Socket Wrenches — *The Choice of Better Mechanics* — **Blue-Point** Mechanic Tools

all official business was postponed until a future meeting. President J. DeWilde presented Mr. S. A. Leitner who gave a very comprehensive history of the accomplishments of the R.S.E.S. to date.

The meeting was then turned over to Mr. T. Andrews, chairman of the Educational Committee who, in turn, introduced Mr. Frank Fillo of the White-Rodgers Electric Company. Mr. Fillo gave an interesting talk on refrigeration controls, following which he congratulated the chapter on the splendid attendance of the evening.

October 10th—Mr. R. G. Elgin of the Wichita Chapter was a visitor for the evening and when called upon made some interesting comparisons of the problems confronting the Kansas City Chapter and Wichita Chapter.

The meeting was then turned over to Mr. Andrews, chairman of the Educational Committee, and Mr. Tom Plouff of the Ansul Chemical Company was introduced. Mr. Plouff gave a talk on the manufacture of SO_2 and methyl chloride and completed his remarks by promising to mail members of the chapter some informative literature on the subject from the Ansul factory.

October 24th—Announcement was made that a representative of the Minneapolis-Honeywell Regulator Company would be present at the next meeting and would be featured on the educational program.

Mr. Leitner gave a report of his tour of new chapters recently formed in Iowa and Nebraska.

Mr. Parman of the DeWilde Refrigeration Service Co. was featured on the educational program and his talk consisted of some information on Norge refrigerators, explaining during the course of his talk the new Norge system employing two refrigerants.

MISSISSIPPI VALLEY CHAPTER

October 13th—The meeting was called to order by Mr. L. Nelson and during the course of business discussed the matter of the chapter stag to be held in the near future, which resulted in instructions to the Entertainment Committee to call a meeting and complete their plans.

The meeting was then turned over to Mr. Smith of the Delavan Engineering Company at Des Moines, Iowa, who gave an informative talk on A-P valves. Those present feel that much valuable information was derived from this talk and thanks were extended to Mr. Smith. Mr. Parker of the same firm accompanied Mr. Smith on his visit.

Refreshments were served following the meeting with the compliments of the Delavan Engineering Company.

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CHICKASAW CHAPTER

October 3rd—The meeting was called to order by President H. G. Thompson, and after the regular routine of business was disposed of an annual election of officers took place. The usual procedure in such matters was followed and the results were as follows: *President,* W. C. Easley; *First Vice-President,* B. L. Bridges; *Second Vice-President,* E. Hunt; *Secretary-Treasurer,* Boyd Evans; *Sergeant-at-arms,* C. R. Drury; *Educational Chairman,* B. L. Bridges; *National Representative,* R. F. Weidlein.

ROCKFORD CHAPTER

October 16th—Mr. Willis Stafford was a guest for the evening and was called upon to give the Chapter as much information as possible on the forthcoming State Convention to be held in Rockford.

Since the election of officers was being held at this meeting, the annual reports of the Secretary and Treasurer were received and President R. C. McCarthy gave a farewell talk in which he thanked the members for their cooperation during his term of office.

Mr. Stafford was called upon to act as chairman of the meeting while the election was being held. After following the usual procedure of annual elections, the final results were: *President,* E. J. Seaton; *First Vice-President,* L. L. Sturch; *Second Vice-President,* Chas. Henley; *Secretary,* Roy Shipman; *Treasurer,* Harry Wardecker; *Sergeant-at-arms,* Roy Erickson; *Directors:* R. C. McCarthy, E. W. Cassidy, O. H. LaBudde; *Educational Chairman,* Don Van Denberg.

After the new officers accepted their positions Mr. Stafford turned the gavel over to the new president, Mr. E. J. Seaton, who adjourned the meeting.

DAYTON CHAPTER

October 13th—An unusual attendance was present for the evening and after the usual business of the evening was conducted, Mr. George H. Clark of the Square D Company was introduced on the educational program.

Mr. Clark outlined the various Square D controls and switches and their many uses.

Following the educational program the meeting was adjourned and refreshments were served to those in attendance.

LINCOLN CHAPTER

October 9th—During this meeting Mr. T. M. Duffield was elected President of the Lincoln Chapter, formed at a recent meeting in the Nebraska capital city and accepted

into the national organization. Other officers are: L. B. Eiche, *Vice-President;* J. E. Cole, *Secretary-Treasurer;* Earl Bowen, *Sergeant-at-arms; Director:* Fred E. Schmidt; *Educational Chairman,* J. F. Wickham.

MOUNT ROYAL CHAPTER

October 10th—The meeting was called to order by President L. J. Boucher, who immediately proceeded with the roll call of officers and other routine of the evening's business.

Mr. J. A. St. Laurent read the minutes of the last meeting and J. M. Turner, treasurer, gave a report of his activities.

Mr. Ross Turner, chairman of the Educational Committee, outlined the program for future educational meetings, stating that Mr. E. A. Vigars of the Canadian General Electric Company would address the next meeting.

On the educational program Mr. Boucher explained cooling systems and their usages, bringing out the fact that cooled water increases employees' health and efficiency, builds good will and saves the company money. The larger systems, Mr. Boucher went on to say, are used by bottlers, bakeries, photographic laboratories, etc., while cooling systems for drinking water are required in offices, stores, mills and factories. He outlined some of the methods used, giving some operating costs. His talk proved very interesting and those present derived much benefit from it.

Following this, Messrs. Ross Turner and Norman Caffrey conducted a Quiz Contest. Mr. J. Ross was the last man down and the members seemed to derive much entertainment and information from the contest.

A suggestion was made that a bowling league within the chapter be formed and after considerable discussion it was decided to leave the matter in abeyance until further investigation.

TWIN CITIES CHAPTER

October 10th—Mr. W. V. Warner, after opening the meeting, invited discussion on ways and means of improving the attendance at the meetings. Mr. I. L. Rubbelke suggested that open meetings be held and that every member make an effort to bring a visitor who would prove to be a prospective member.

Further plans were discussed for making an exceptional meeting out of the November meeting and President Warner appointed a committee consisting of Mr. C. A. McCafferty, chairman, Mr. H. E. Schaeffer, Mr. A. G. Larson and Mr. A. M. Palen to arrange entertainment features for that evening.

On the educational program for the evening, a debate was discussed on the subject of whether or not heat is more beneficial to

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mankind than water. In the debate Mr. C. A. McCafferty took the negative side while Mr. A. G. Larson took the affirmative. The judges—Messrs. A. M. Palen, J. D. Stewart and W. E. Gleb—decided in favor of the affirmative, and President Warner awarded Mr. A. G. Larson the prize.

PITTSBURGH CHAPTER

October 13th—After the usual routine of business, Mr. E. V. Black presented Mr. C. V. Hale of the Melchior Armstrong Dessau Company, who demonstrated and described the use and operation of the Sperti ultra-violet lamp. In the discussions following the demonstration, many questions were answered by Mr. Hale and Mr. Gill.

Mr. R. V. Davis of the Kerotest Manufacturing Company was then introduced and made a few remarks regarding new products produced by his company.

Mr. L. C. Laderer reported on the progress made by the Code Committee.

LONG BEACH CHAPTER

October 5th—Second Vice-President A. T. Riley opened the meeting, later turning it over to President Voepel, who arrived late.

There was little business to be conducted for the evening and the meeting was, therefore, turned over to Mr. I. A. Hammer who presented Mr. Hadley Hatch of the Mueller Brass Company. Mr. Hatch presented an interesting talk on line valves and brass fittings.

Following the meeting the members adjourned to the Anaheim Landing at Seal Beach for a wiener bake, beer and coffee. Forks were furnished and a table set with the necessary buns and trimmings and each member learned the art of roasting his own hot dog over an open fire.

Stories followed the bake, with John Engels taking the prize. The speaker and refreshments for the evening were furnished by the Refrigeration Supplies Distributor Long Beach store.

LOS ANGELES CHAPTER

October 17th—As usual, the meeting was held in Scully's Cafe and was called to order by Vice-President William Young.

Several new applications for membership were accepted by the chapter and the members welcomed them to the meeting.

The meeting was turned over to Mr. E. Blair, who introduced Mr. Lindahl of the Super-Cold Corporation, who gave an interesting talk on "Selling Profits and Not Labor."

Mr. Eddie Nelson of the Union Ice Company furnished a moving picture in color

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TRI-STATE CHAPTER

October 9th—The usual preliminary business session of the chapter was first dispensed with.

The Chairman of the Entertainment Committee asked for suggestions from the members regarding entertainment for future meetings and a general discussion followed during which several suggestions were offered. It was suggested that an effort be made to get more dealers to join the Society as Associate Members in order to promote a better feeling and closer relationship between the members of the chapter and the dealers. After some discussion, Claude Brunton offered to see the dealers and try to arrange a joint meeting at which the objects of the Society could be explained to them and an effort made to get them to join.

It was voted that the October 23rd meeting would be held at Ironton, Ohio, at the home of A. W. Gruber.

The educational program consisted of questions and answers conducted by the Educational Commitee.

October 23rd—President Gruber presided over the meeting and called for the various committee reports, etc.

Mr. Claude Brunton reported progress on the plans for a meeting of dealers and service men.

Secretary Albertsen reported on the desire of Mr. H. A. Lightner of the Vocational Training School that a member of the group be appointed to serve with members of other groups on a committee to pass on the eligibility of applicants for admission to the school. After some discussion a motion was passed that the President appoint a member to act with the committee.

As a suggestion for improving the attendance and interest at meetings, Jimmie Cottle suggested that those of our members who were irregular in their attendance be asked to prepare papers or talks to be given before the members at future meetings, in order to give them an active part in the meetings.

MILE HIGH CHAPTER

October 11th—Since the election of officers was to be held on this evening, the greater part of the business meeting was devoted to reports from the Secretary and Treasurer and to a summing up of the year's activities by the various committee chairmen. President J. Lind delivered his parting address, thanking the members for their cooperation during the past year.

The election was then held and the follow-

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ing officers were elected for the ensuing year: *President,* J. Lind (re-elected); *Vice-President,* E. L. Huff; *Secretary-Treasurer,* H. R. McCombs; *Sergeant-at-arms,* William Reiter.

MONTGOMERY CHAPTER

October 5th—Some discussion was called for on the possibility of drawing up a list of standard prices to be used by local service companies,—this for the purpose of standardizing on the discounts allowed and the amounts charged for certain materials.

Further discussions were conducted on such specific work as electrical wiring, such state and city requirements as licensing, etc.

Following these discussions, refreshments were served and an informal evening was enjoyed.

MICHIANA CHAPTER

October 10th—The attendance at this meeting included members from Kalamazoo, Michigan; Warsaw, LaPorte and Michigan City, Indiana. Getting members to attend meetings, who come from such far away points, attests to the activity and good spirit of the chapter.

The speaker at this meeting was Mr. John A. Schenck, manager of the Chicago office of the Alco Valve Company. Mr. Schenck gave a talk on refrigerant control and demonstrated the operation of thermostatic expansion valves by means of a glass refrigeration system.

BOSTON CHAPTER

October 9th—After the minutes of the previous meeting had been read and the roll call of officers was disposed of the subject of a permanent meeting place was discussed at some length. Prospect Hall at 40 Prospect Street, Cambridge, was selected as the most logical place for regular meetings, while larger quarters may be selected for special occasions.

The President asked for volunteers to serve on several committees but since the response was not satisfying he took upon himself the responsibility of selecting these committees which will be announced at the forthcoming meeting.

Mr. House and Mr. Huntly of the Mueller Brass Company were introduced and although the contest which had been previously arranged to be sponsored by this company had to be postponed, Mr. House presented an interesting demonstration on the art of soldering which proved quite educational.

MONUMENTAL CHAPTER

September 13th—The meeting was called to order by President Gibbons and during

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the course of the evening's business six new members were welcomed to the chapter.

Following up previous business which had been discussed in former meetings, a proposal was presented to the chapter in which it is planned to alter Article 9, Section 1, of the chapter's constitution.

Mr. E. Kellie of the American Injector Company was then introduced by Mr. E. Zimmerman, chairman of the Entertainment Committee. Mr. Kellie gave an instructive talk on oil separators and where they are used to the best advantage.

TRI-COUNTY CHAPTER

September 15th—Vice-President Willis Stafford called the meeting to order and the minutes of the last meeting were read and the Treasurer's report was received. Considerable discussion followed on ways and means of getting new members at the meetings, and dates for future meetings were decided upon.

Upon calling for suggestions for future educational programs, it was suggested that Mr. Marc Shantz of Fedders Manufacturing Company be asked to talk at the next meeting.

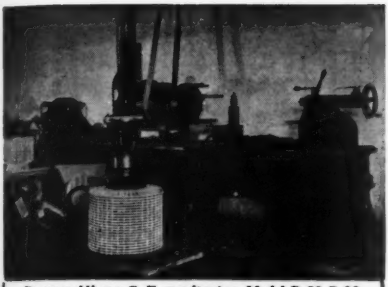
The meeting was held at the home of Mr. and Mrs. Harold Dowell, and refreshments were served by them after adjournment.

TRI-STATE AUXILIARY

THE regular meeting of the Tri-State R.S.E.S. Auxiliary was held at the home of Mrs. James A. Cottle of Huntington, W. Va., instead of at Mrs. A. W. Albertsen's, due to her illness.

A suggestion was made and carried for the chapter to purchase a box of miscellaneous greeting cards. This will be for the purpose of sending a birthday card to each member on her birthday; a get-well greeting to one who is ill, etc. The ladies decided to have the next meeting in the form of a Halloween party, which will be held at the home of Mrs. Gruber, Monday, Oct. 23rd.

On Monday night, Oct. 23, the members of the R.S.E.S. and the Auxiliary met at the home of Mr. and Mrs. A. W. Gruber in Ironton, Ohio, for their meeting and a Halloween party. Most of the evening was spent in guessing those who came masked, and in playing various games. Prizes were given to the three best dressed as follows: Mrs. Forrest Poole, Mrs. Claude Brunton, and Mrs. James Cottle. Later, the two groups met separately for their respective



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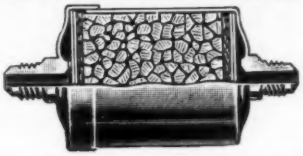

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meetings. After the business was taken care of we indulged in a buffet supper. Everyone enjoyed a glorious evening of fun and feasting.

KANSAS CITY AUXILIARY

ON September 12th the meeting was called to order by Mrs. O. R. Irwin, president. There was a discussion on an educational program and the Chairlady of the Educational Committee agreed to be prepared to start a study of parliamentary law at the next meeting. The President announced there would be a suggestion box at the next meeting and each member was invited to bring a written suggestion for the welfare and/or entertainment of the Auxiliary.

Husbands of the Auxiliary members were treated to a watermelon feast after their respective meetings adjourned.

On September 26th no business meeting was held. Ten members and one visitor enjoyed an evening of entertainment, which was furnished by Mrs. Andrews and Mrs. DeWilde. Prizes were won by Mrs. Anderson and Mrs. Irwin.

On October 11th the meeting was called to order by Mrs. O. R. Irwin, president. A report was made on prospective members who had been called on since the previous meeting. It was unanimously agreed that hereafter each member answer the roll call with a favorite recipe or household hint. Mrs. Green, Mrs. Hataway and Miss Smith were appointed to furnish entertainment for the next meeting. A suggestion was made and it was agreed to start a set of dishes for the prizes given on entertainment nights.

RAPID DRUM CHARGERS

(Continued from page 27)

day long, charging one cylinder after the other.

The switch (H) at the lower left hand side of the panel is for starting and stopping the vacuum pump. The gauge (G) immediately above the switch registers the vacuum in the cylinder and charging hose during the evacuation process prior to charging. The valve (E) in the upper right hand corner is for discharging used refrigerant to the atmosphere.

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A NUMBER of progressive service organizations, ever alert to profitable expansion of their business, have been awarded an exclusive franchise of Lowry Process coil cleaning system and thereby added a beer coil cleaning division with satisfactory results. In their investigations, these service organizations found that they were servicing a considerable number of mechanical beer cooling installations in hotels and taverns who also contracted independently for beer

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coil cleaning service once or twice a week as regular routine. It was further discovered that a number of refrigeration service calls were necessitated by unsatisfactory beer coil cleaning methods. It seemed to them, therefore, that representation of a reliable beer coil cleaning company was a natural hook-up, for not only could they secure the beer coil cleaning business in most cases, but were also able to save their customers a number of expensive service calls by reason of introducing the thoroughly satisfactory Lowry

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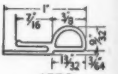

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Process method of beer coil cleaning. A further incentive was the fact that the change from ice to mechanical refrigeration, not only offered an opportunity for them to demonstrate and sell a certain type of refrigeration equipment, but gave them the refrigeration service and beer coil cleaning business in addition.

A Lowry Process franchise is a valuable franchise and awards to the owner (operator) the following very definite advantages:

1. Ability to earn a handsome and progressive income in a very profitable and interesting business.
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3. Thorough practical training in:
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A dispenser must have his coils cleaned at least once every week and the Lowry Process operator soon dominates the business in his area by superior service.

A potential customer is any place that sells draught beer. A recent survey reveals that 92 customers per week per machine is the average number serviced by Lowry Process operators that have been in business four months or longer. Many of these operators report routes of 100 to 125 customers with an average weekly income of $110.00 to $150.00 per machine. The small tavern or restaurant may have only two taps, but the larger places have anywhere from two to ten and the bill is based on the number of taps.

Breweries also have tap rooms and more brewery tap rooms are serviced by the Lowry Process method in the United States and Canada than by any other coil cleaning method known. To clean the coils in the brewery tap room means eventually the operator will clean the coils in every tavern where their beer is sold.

Investment in one Lowry Process machine carries with it a territorial franchise and a free educational service from the head office in Detroit. The complete story is an interesting one and is set forth in detail in an attractive booklet issued by the Lowry Manufacturing Company entitled "A Profitable Business." Service organizations should write for a free copy of this booklet and other information relative to a franchise to the head office of the company at 318 East Milwaukee Avenue, Detroit, Michigan. The

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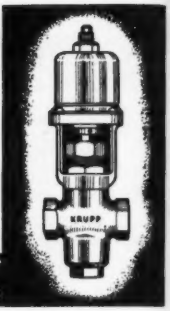

CYRUS SHANK COMPANY

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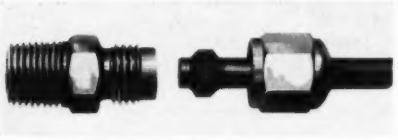
whole proposition is entirely worthy of their complete investigation.

NEW TUBE CONNECTOR

A NEW method of connecting copper and aluminum tubing to pipe-threaded tapped holes is announced by VibraSeal Corporation. The method which is described as "a new system" is said to protect against tube fatigue and failures, to dampen vibration, noise and heat flow, to require no flaring, and to absorb vibratory strains which commonly result in tube breakage.



THE NEW CONNECTOR

The removal of noise especially in connection with the operation of compressors is one of the advantages claimed for this system.

In use, a threaded nipple or adapter is screwed into a threaded or tapped hole, a VibraSeal (rubber-like gasket) is placed on the tubing and a locknut used to compress or spin the VibraSeal to form a flexible seat, making a tight, leak-proof, connection with the ability to permit tubing flex in a movement of several degrees in any direction.

The connection may be made even if the tubing is not in precise alignment as the permitted radial movement, due to the flexible seat, allows quite a latitude in this connection. The VibraSeal is claimed to be impervious to the action of oils, gasoline or gases and is thus susceptible of use in transmitting fuels, lubricating oils, compressed air, and gases of any character without leakage.

The action of VibraSeal fittings may be compared to a ball and socket conduit joint with a limited travel on vertical and horizontal planes. By holding tubing in a nonmetallic grip the breakage of tubing caused by local stress and fatigue is claimed to be eliminated.

The system was developed by Sumner Wiltse and Henry Lathrop, executives of VibraSeal Corporation, and is presently sold

don't forget

Most orders shipped same day as received.

Blythe carries everything you need in parts, tools, and supplies for refrigeration and air conditioning. Our prices are always lowest. Write on your letterhead for catalog.

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SEALS VALVES UNITS CONTROLS

Canada FASTEST GROWING PARTS CO.

SERVING CANADIAN SERVICEMEN TODAY

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NOW SEE THEM!

If you haven't already seen the Rempe Units and learned how really efficient they are, plan to spend a few minutes with them at the Refrigeration and Air Conditioning Exhibition. We'll welcome you in Booth 60 at the Stevens Hotel, Chicago, January 15 to 18.

REMPE UNITS

REMPE CO., 340 N. Sacramento Blvd., CHICAGO

Also stocked by Leo S. Bosarge Co., 315 Spring St., N. W., Atlanta, Ga.

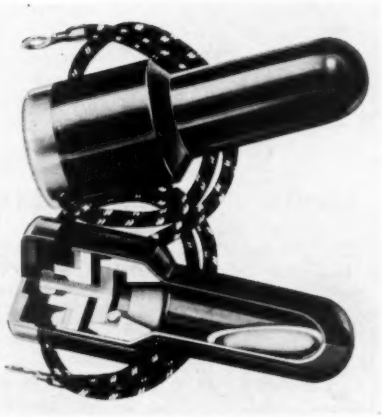
to accommodate a range of tube sizes from ⅛ inch to 2 inches O.D. These come in constructions designed to hold up to 300-400 pounds static pressure. Other developments of the Corporation provide for fittings for hydraulic lines, aircraft fittings for safety fuel and oil lines, and special types for transmission of corrosive materials.

Samples of the fittings are available to any of our readers on request.

* * *

NEW METAL MERCURY SWITCH

CONTACT-CONSCIOUS mechanical and electrical engineers should be interested in the silent unbreakable, non-inflammable Durakool Metal Mercury Switch, and its new double reduction. Manufacturers of the switch claim that their two reducing agents prevent deterioration of the mercury, increase the efficiency and reliability in operation and assure long uninterrupted life of the switch. Durakools, they say, are the only commercial mercury switch available over 40 amperes, and up to 200 amperes. They may, on special order, be made for even greater capacity. They are said even to withstand temporary short circuits, to



CUT AWAY VIEW OF SWITCH

operate with small tilt with remarkably little energy, and that this recently improved mercury switch allows many new applications, from wall switching to motor starting. They are being used on electrical devices requiring from a few contacts a month to 2400 a minute and are guaranteed for three years.

Look for the RED BOX

You'll find it on your jobber's counter. It means gaskets to fit all makes, old and new, and it means they're cut accurately, TO FIT.

Send for new Bulletin No. 40B showing sets.

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G.E.—Westinghouse and Majestic

Customers in 37 states had hermetically sealed units rebuilt or exchanged by us in the past year. Complete factory equipment for precision rebuilding. One year guarantee on all rebuilt units. Exchange service available on most makes and models. Write for prices and descriptive literature.

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For a Good Service Organization

A number of Service Organizations and Refrigeration Distributors throughout the country have been awarded an exclusive franchise for—

LOWRY PROCESS
Beer Coil Cleaning System

It is a perfect tie-in with your present business—and is **highly profitable.**

LOWRY PROCESS is an organization of international reputation which has marched to leadership and broadcasts the undisputed fact that "More Coils are cleaned and more Breweries serviced by LOWRY PROCESS than by any other method in America."

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433 N. Waller Ave. Chicago

Write for Samples and Prices

FRIEZ WINDOWSTAT

THIS unique instrument for the prevention of condensation on windows or other chilled surfaces now incorporates new features. It is announced by Julien P. Friez & Sons, Division of Bendix Aviation Corporation.

The Windowstat employs the Friez patented human hair element which detects the approach of condensation, and through its electrical contacts either overrules the ordinary humidity control, shutting off the humidifier, or, acting as an independent control, starts fans, heaters or other dehumidifying equipment. In the latter capacity the Windowstat is extremely useful for store windows, display cases, and like applications.

SHOWING THE WINDOWSTAT INSTALLED

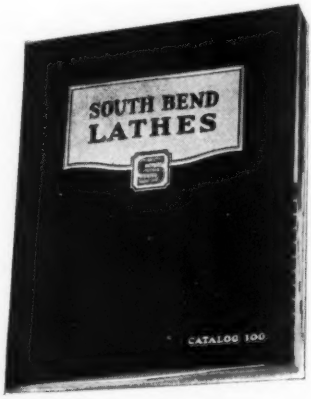
The Windowstat is compact and attractive in its new moulded plaster case, completely automatic in operation. At no time does it lower the humidity control point more than is necessary to prevent condensation. It can be used on either line or low voltage (50 V. A. at 120 V.) and measures 4½ inches x 1¾ inches x 5⅜ inches wide.

NEW SOUTH BEND LATHE CATALOG

THE South Bend Lathe Works has just issued a new catalog which is said to be the most complete lathe catalog ever published. This catalog contains 112 pages with over 250 illustrations and shows 75 different sizes and types of South Bend back-geared screw cutting lathes for production manufacturing, tool room and general shop

work. A copy will be mailed on request to the Refrigeration Service Engineer.

Sizes of lathes illustrated are 9", 11", 13", 14½", 16" and 16-24" swing. Each size is shown in several different models with motor drive and countershaft drive. New items



shown for the first time in this catalog include a one inch Collet capacity precision bench lathe mounted on a welded steel bench, and a complete line of 14½ inch swing lathes.

TRENTON CHANGES NAME

Kramer Trenton Company, Trenton, New Jersey, is the new name of the company which manufactures Kramer coils, radiators, devices for cooling, heating and refrigeration. The name formerly was The Trenton Auto Radiator Works.

The change in no manner affects the personnel of the company, of which Mr. Nathan Kramer is president, and Mr. Israel Kramer, secretary and treasurer.

NEW HACK SAW FRAME ANNOUNCED

Bonney Forge & Tool Works, Allentown, Pa., recently added a sturdy hack saw frame to its already extensive line of sockets, wrenches, punches, chisels, hammers, pliers, screw drivers, body and fender tools, etc.

Known as No. 2628, it is of the adjustable type and will accommodate blades from 8 inches to 12 inches long. Blades may be faced

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METHYLENE CHLORIDE
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DRIERITE
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MAJESTIC — COLD SPOT
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COMMERCIAL LINE refrigerator display cases, walk-in coolers, and refrigerators; also direct draw, mechanically-cooled beer coolers. Sell with Ehrlich compressors or with any other make. Attractive discounts, also financing arrangements to help sell. 70 years in business. Write for full information. Ehrlich Refrigerator Mfg. Co., St. Joseph, Mo.

She's helping others to health! And you can too . . . if you resolve right now to mail no letter—send no package—unless it is decorated with the Christmas symbol that saves lives.

Since 1907, the annual sale of Christmas Seals has helped to support the campaign to eradicate tuberculosis in the United States.

During these years of concentrated effort, the death rate from tuberculosis has been cut three-quarters! Yet, tuberculosis still kills more people between the ages of 15 and 45 *than any other disease!*

No home is safe from tuberculosis until *all* homes are safe.

The National, State and Local Tuberculosis Associations in the United States

1939 BUY CHRISTMAS SEALS

in four directions. The checkered steel pistol grip fits comfortably in the hand. The entire tool is full nickel finished and sturdily built to withstand long, hard service.

Bonney has also added a full line of 10-inch and 12-inch blades in coarse, medium and fine series made of Tungsten Alloy Steel with flexible back and hardened teeth to take care of all ordinary cutting jobs.

For difficult jobs such as cutting chrome nickel and high carbon steel, they recommend their "All Hard Hack Saw Blades" made of Molybdenum High Speed Steel, available in the same lengths and series.

BLYTHE AUTOMOTIVE ACCESSORY CATALOG

H. W. BLYTHE CO., 2334 S. Michigan Ave., Chicago, well known refrigeration parts distributing company, has recently issued a 16-page, 8½x11-inch automotive accessories catalog which will be mailed to any refrigeration service engineer on request.

The catalog contains items, such as heaters, guards, driving lights, etc., and in addition household appliances, humidity guides, barometers, thermometers and small radios.

AMCOIL IN AIR CONDITIONING

THE American Coils, Inc., of 25-27 Lexington Street, Newark, N. J., has just announced their entry into the refrigeration and air conditioning coil industry.

The plant is under the supervision of Mr. C. A. Sewell, who for the past eleven years has been in charge of production and research for the Larkin Refrigerating Corp. and their successors, Larkin Coils, Inc., of Atlanta, Georgia.

Adams Engineering Co.

offers

immediate replacement from our stock of General Electric and Westinghouse. Guaranteed units— lowest prices.

Write or wire

2074 Webster Ave., New York, N. Y.

Telephone-Fordham 4-4424

The Sales Department is under the supervision of Jack Riordan, who up until the time of his resignation on July 15th, of this year, was in charge of the New York branch of the Larkin Refrigerating Corp. and their successors Larkin Coils, Inc.

The air conditioning department is in charge of T. J. Charles, who for the past 27 years has been identified with the heating-ventilating and air conditioning industry, both in a sales and engineering capacity.

S S S

THE REFRIGERATION SERVICE ENGINEER

November, 1939

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, and March 3, 1933, of THE REFRIGERATION SERVICE ENGINEER, published monthly at 435 North Waller Ave., Chicago, Ill., for October, 1939.

State of Illinois, Cook County, ss:—Before me a Notary Public in and for the State and county aforesaid, personally appeared J. F. Nickerson, who, having been duly sworn according to law, deposes and says that he is the editor of THE REFRIGERATION SERVICE ENGINEER, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, and March 3, 1933, embodied in section 433, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Nickerson & Collins Company, Chicago, Ill.; Editor, J. F. Nickerson, Chicago, Ill.; Managing Editor, H. T. McDermott, Oak Park, Ill.; Business Manager, L. R. Townsley, Chicago, Ill.

2. That the owners are: Nickerson & Collins Co., Chicago, Ill.; J. F. Nickerson, Chicago, Ill.; Henry Torrance, Jr., New York City; M. B. Livezey, Philadelphia, Pa.; L. R. Townsley, Chicago, Ill.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: There are no bondholders, mortgagees, or other security holders.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, as they appear upon the books of the company but also in cases where the stockholders or security holder appears upon the books of the company as trustee or in any other fiduciary relation, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which the stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

(Signed) J. F. NICKERSON, Editor.

Sworn to and subscribed before me this 20th day of September, 1939. L. R. Townsley, notary public. [Seal.] (My commission expires July 8, 1940.)

If you threw away your tools—

Could you work with your fingers and thumbs? Of course not! A good workman needs good tools.

The same is true with training. The better the training the better job he can do.

. . . And the better job he does the more money he makes. U.E.I. training can help YOU increase YOUR profits!

Make us prove it! A request for information places you under no obligation. Write to the Chief Engineer.

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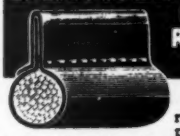
FOR ALL MAKES REFRIGERATOR DOORS



A complete line of rubber - coated, packed Gaskets and extruded rubber Gaskets that last longer —retain higher efficiency—because made of finest materials and workmanship. Write for free samples, giving your jobber's name and address.

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Reconditioned Like New

Precision work by experts. Years of satisfied customers, among the largest in the country. *All work guaranteed.* TRY US and be convinced. The largest thermostatic repair service in the country. IT'S YOUR GUARANTEE. *Prices on request.*

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Index to Advertisements

Adams Engineering Co. 61
Airco Refrigeration Parts 56
Airo Supply Co. 50
Alco Valve Co. 6
Alter Co., The Harry 48
Aluminum Ore Co. 43
Ansul Chemical Co. 45
Automatic Heating & Cooling Supply Co. 53
Automatic Products Co. 2

Blythe Co., H. W. 56
Bonney Forge & Tool Works ..... Back Cover

Channon Co., H. 54
Chicago Eye Shield Co. 51
Chicago Hermetic Rebuilders 60
Chicago-Wilcox Mfg. Co. 57
Cornell-Dubilier Electric Co. 5

Dennis & Co., W. J. 61
Detroit Lubricator Co. 10

Fedders Manufacturing Co. ..... 32 and 33
Flushing Refrigeration Co. 53

General Controls 50
Gilmer Co., L. H. 47
Goldberg Co., Herman 54

Hammond Drierite Co., W. A. 52
Henry Valve Co. ..... Inside Back Cover
Highside Chemicals Co. 55

Imperial Brass Mfg. Co. 62

Jarrow Products Corp. 54

Kelvinator Div. of Nash-Kelvinator Corp. 3

Lowry Mfg. Co. 58

Manufacturers Fin Coil Co. 55
McIntyre Connector Co. 52
Modern Equipment Corp. 41
Modern Gas Co. 63
Mueller Brass Co. 4

New Duty 60

Peerless of America, Inc. 37
Practical Instrument Co. 51

Ranco, Inc. 8
R. & H. Chemicals Dept. 49
Rempe Co. 57
Rex Refrigeration Service, Inc. 57
Rotary Seal Co. ..... Inside Front Cover

Shank Co., Cyrus 56
Snap-on Tools Corp. 46
Square D Co. 1

Tecumseh Products Co. 44

United Repair Co., Inc. 61
Utilities Engineering Institute 61

Virginia Smelting Co. 59

Weatherhead Co., The 7

With **IMPERIAL FITTINGS** *the system remains tight!*

THE success of any refrigeration or air conditioning system is absolutely dependent upon tight connections.

Imperial fittings in both S.A.E. flared type and solder type have been especially designed for refrigeration work.

Nuts, tees, elbows and crosses are made from brass forgings and will not crack or split. They are heavier and stronger than the standard S.A.E. fittings and are non-porous, eliminating seepage and season cracking. Tees and elbows have flats for wrench hold. On fittings with female threads made from rod, Imperial uses an extruded bronze rod. This extruded bronze is not subject to season cracking. Imperial solder fittings are forged with the exception of couplings and return bends which are made from drawn seamless copper tube.

Imperial Brass Mfg. Co., 1204 W. Harrison St., Chicago

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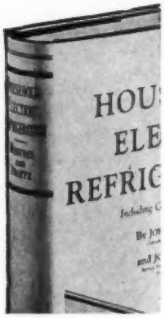
IMPERIAL *Air Conditioning and Refrigeration Products*

VALVES • FITTINGS • TOOLS • CHARGING LINES • FLOATS • STRAINERS • DEHYDRATORS

A New Book!

How to install, service, and repair all types of household refrigerators.

This book presents everything needed by the man who is servicing electric refrigerators, from a simple explanation of how they work to detailed, practical methods and data on installation, testing, servicing, adjusting, trouble-shooting, repairing, etc.



Household Electric Refrigeration

Including Gas Absorption System

By Wostrel and Praetz

406 pages, illustrated, $4.00

A practical manual for installation and refrigeration service men, giving descriptions and illustrations of many popular makes of machines, showing both the entire system and details of parts, and emphasizing the basic points of construction and operation. Besides the step-by-step descriptive material, numerous charts and tables giving reference information in handy form make this a practical book.

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1939 season, the best so far

get *additional business* in 1940 servicing

Meter-Misers

with

HERVEEN

Every day more service men are profiting by additional business, because HERVEEN has opened the way to Meter-Miser servicing.

A wide jobber distribution makes it quickly available. If your jobber don't stock it—write direct.

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Manufacturers and Refiners

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Here's a service man who has *used* the H.B.P. Calculator

• Now that the Calculator is being put to the test of practical use in the field, we have had a number of letters from service men testifying to its value. The one at the right, from Fred Hartman of Albert, West Virginia is typical

Before I proceed with my questions I wish to say a few words about the Head-Back Pressure Chart I ordered from you. I find that when the temperatures and pressure are set correctly, it will give the proper head pressure and if a compressor is set to operate according to the head pressure derived from the chart the outfit will operate correctly if the trouble has been cured. I have tested this for about four weeks and would not be without one when I do my service work. It is the best out so far.

Fred Hartman

The purpose of the Head-Back Pressure Calculator is to quickly determine the proper head pressure, for the following refrigerants when the suction pressure, room temperature or mean water temperature is known.

Carrene	Methyl
Isobutane	Freon or F-12
Sulphur Dioxide	Ammonia
Carbon Dioxide	

Actual Size 3½" x 3½".

A Vestpocket Tool Every Service Man Should Carry

A number of troubles can be detected by comparison of the existing head pressure and what the head pressure should be, but in the past there has been no convenient method available to the service engineer to determine what the correct head pressure should be. Such variable conditions as the suction pressure, room temperature, water inlet and outlet temperature, kind of gas used, etc., all determine the proper head pressure. It is not practical to depend on one's memory of other similar conditions or to just use snap judgment when this handy calculator gives you the correct answer so easily. Send for it today! Sturdily constructed, with oil-proof finish, for on-the-job use.

POSTPAID $1.00

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(*To be tune of* "THE MAN ON THE FLYING TRAPEZE")

If when hunting for orders,
More sales you'd complete,
Go gunning with Henry
And you can't be beat!
Henry leads in design
And is priced to compete,
And insures you more
Profit each day.

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With the greatest of ease,
Your trade—with these products—
You're certain to please,
They'll sing forth your praises
with "Oh!"s, "Ah!"s and
"Gee!"s,
It's a cinch to bag orders that way.

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Most Complete Line of Refrigerant Valves, Dehydrators and Strainers—Also Valves and Forged Steel Fittings for Ammonia and High Pressure Industrial Requirements

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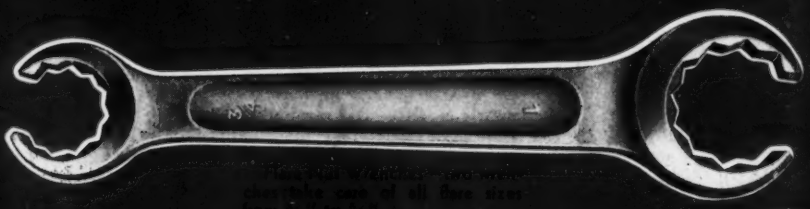
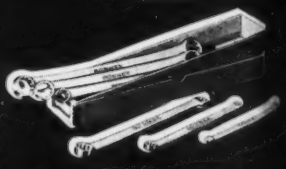


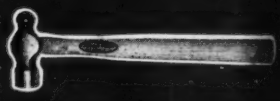
The Right Bonney Tool for Every Purpose

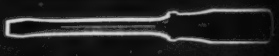
NO matter what your refrigeration service tool requirement may be, you're sure to find the right tool in the Bonney Line.

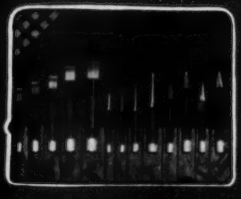
Designed especially for refrigeration work and made of the finest steels obtainable, service men everywhere recognize them as "The Finest That Money Can Buy."

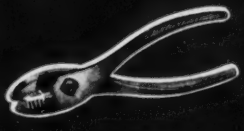
See your jobber or write for complete catalog.











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